8035XA

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P AK
POWER
SENSORS

Giga-tronics

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Operation & Maintenance Manual

Series 8035XA
Peak Power Sensors

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Giga-tronics Series 8035XA Peak Power Sensors are warranted against defective materials and workmanship for one year from date of shipment. Giga-tronics will at its option repair or replace products that are proven defective during the warranty period. This warranty DOES NOT cover damage resulting from improper use, nor workmanship other than Giga-tronics service. There is no implied warranty of fitness for a particular purpose, nor is Giga-tronics liable for any consequential damages. Specification and price change privileges are reserved by Giga-tronics.

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About This Manual

This manual contains the following chapters to describe the operation and maintenance of Series 8035XA Peak Power Sensors:

Preface: In addition to a comprehensive Table of Contents and general information about the manual, the Preface also contains a record of changes made to the manual since its publication, and a description of Special Configurations. If you have ordered a user-specific manual, please refer to page vii for a description of the special configuration.

Chapter 1: Introduction: This chapter is an introduction to the instrument and it's performance parameters.

Chapter 2: Operation: This chapter is a guide to operating the sensor with the Series 8540X Universal Power Meters and the Model 58542 VXIbus Universal Power Meters.

Chapter 3: Theory of Operation: This chapter provides a block diagram level description of the sensor and its circuits for maintenance and applications.

Chapter 4: Performance Verification Tests: Procedures for inspection, calibration, and performance testing are outlined in this chapter.

Chapter 5: Maintenance: This chapter contains procedures for maintenance and troubleshooting.

Chapter 6: Parts Lists: This chapter lists all components and parts and their sources.

Chapter 7: Diagrams: This chapter contains schematics and parts placement diagrams for all circuits.

Conventions

The following conventions are used in this product manual. Additional conventions not included here will be defined at the time of usage.

Warning

WARNING

The WARNING statement is enclosed in double lines and centered in the page. This calls attention to a situation, or an operating or maintenance procedure, or practice, which if not strictly corrected or observed, could result in injury or death of personnel. An example is the proximity of high voltage.

Caution

CAUTION

The CAUTION statement is enclosed within a single heavy line and centered in the page. This calls attention to a situation, or an operating or maintenance procedure, or practice, which if not strictly corrected or observed, could result in temporary or permanent damage to the equipment, or loss of effectiveness.

Notes

☛ **NOTE:** A NOTE highlights or amplifies an essential operating or maintenance procedure, practice, condition or statement.

Logic NOT

A logic NOT or LOW condition used in text will be indicated by an overscore, such as $\overline{\text{LOAD-CTR}}$. Elsewhere, such as in schematics, a logic NOT or LOW condition may be indicated by a forward slash bar, such as /LOAD-CTR.

Key Press Commands

Commands requiring specific keys to be pressed on the supporting device, such as a power meter, are indicated by square brackets. For example, [ENTER] means to press the Enter key.

Record of Manual Changes

This table is provided for your convenience to maintain a permanent record of manual change data. Corrected replacement pages will be issued as Technical Publication Change Instructions, and will be inserted at the front of the binder. Remove the corresponding old pages, insert the new pages, and record the changes here.

Change Instruction Number	Change Instruction Date	Date Entered	Comments

Special Configurations

When the accompanying product has been configured for user-specific application(s), supplemental pages will be inserted at the front of the manual binder.

Remove this page and replace it with the furnished Special Configuration supplemental page(s).

1 Introduction

1.1 Description

The 8035XA Series Peak Power Sensors perform true sample-based peak power measurements on pulsed signals. The sensors are compatible with Giga-tronics Series 8540 Universal Power Meters and the Model 58542 VXIbus Universal Power Meter (see Section 1.2.2). The sensors operate from 45 MHz to 18, 26.5, and 40 GHz. High power versions of 5, 25, and 50 Watts, are available to 18 GHz (see Table 1-1).

Peak Power sensors have three modes of operation: (1) CW, (2) Peak, internally triggered, and (3) Peak, externally triggered. When operated in the peak modes, trigger-point to sample-point delay (sample delay) is adjustable from -20 ns to 100 ms in 0.5 ns steps. Trigger levels are also adjustable.

The Giga-tronics proprietary power sweep calibration system provides excellent linearity from -20 dBm to +20 dBm in Peak modes, and from -30 dBm to +20 dBm in CW mode. Cal Factors stored in EEPROMs in the power sensors automatically compensate for sensor frequency response variations. This unique approach can be configured for automatic frequency response correction. A detector output signal is provided for viewing the detected envelope of the pulsed RF waveform on an oscilloscope. Use of a digital oscilloscope is recommended.

1.1.1 Accessories

Included:	3 each SMB (plug) to BNC (m) cables, 2 m (6 ft) long 3 each Cable Harness Wraps, 1.2 m (4 ft) long
Optional:	Option 02: 12 ft SMB (plug) to BNC cable Option 03: SMB (plug) to SMA (jack) adapter

1.1.2 Product Returns

Should it be necessary to return the product to Giga-tronics, use the original shipping container. If this is not possible, use a strong carton (350 lbs/in^2 bursting strength), or a wooden box. Wrap the instrument in heavy paper or plastic before placing it in the shipping container. Completely fill the areas on all sides of the instrument with packaging material, taking extra precautions to protect the front and rear panels. Seal the package with strong tape or metal bands. Mark the outside of the package "FRAGILE — DELICATE INSTRUMENT".

If corresponding with the factory or the local Giga-tronics sales office regarding a product return, please refer to the full model number and serial number. If the instrument is being shipped for repair, be sure to enclose all available pertinent data regarding the problem that has been found.

☛ **NOTE:** If you are returning an instrument to Giga-tronics for service, first contact Customer Service at **(800) 444-2878** or Fax at **(510) 328-4702** so that a return authorization number can be assigned. You can also contact Customer Service over their e-mail address ***repairs@gigatronics.com***

1.2 Specifications

Table 1-1. Peak Power Sensor Model Specifications

Model	Freq. Range/ Power Range	Maximum Power	Power Linearity[4]	VSWR	RF Conn	Dimensions Lngth	Dimensions Dia	Wgt
Standard Peak Power Sensors								
8035XA	45 MHz to 18 GHz -20 to +20 dBm, Peak -30 to +20 dBm, CW	+23 dBm (200 mW) CW or Peak	-30 to -20 dBm ±0.00 dB -20 to +20 dBm ±0.05 dB/10 dB	45 MHz - 2 GHz: 1.12 2 GHz - 12.4 GHz: 1.22 12.4 GHz -18 GHz: 1.37	Type N(m) 50Ω	165mm (6.5 in)	37mm 1.25 in)	0.3 kg (0.7 lb)
80353A	45 MHz to 26.5 GHz -20 to +20 dBm, Peak -30 to +20 dBm, CW	+23 dBm (200 mW) CW or Peak	-30 to -20 dBm ±0.00 dB -20 to +20 dBm ±0.1 dB/10 dB	45 MHz - 2 GHz: 1.12 2 GHz - 12.4 GHz: 1.22 12.4 GHz - 18 GHz: 1.37 18 GHz - 26.5 GHz: 1.50	Type K(m)[1] 50Ω	165mm (6.5 in)	37mm (1.25 in)	0.3 kg (0.7 lb)
80354A	45 MHz to 40 GHz -20 to +0.0 dBm, Peak -30 to +0.0 dBm, CW	+23 dBm (200 mW) CW or Peak	-30 to -20 dBm ±0.00 dB -20 to 0.0 dBm ±0.2 dB/10dB	45 MHz -2 GHz: 1.12 2 GHz - 12.4 GHz: 1.22 12.4 GHz -18 GHz: 1.37 18 GHz -26.5 GHz: 1.50 26.5 GHz - 40 GHz: 1.92	Type K(m)[1] 50Ω	165mm (6.5 in)	37mm (1.25 in)	0.3 kg (0.7 lb)
5W Peak Power Sensor [2,5]								
80351A	45 MHz to 18 GHz 0.0 to +40 dBm, Peak -10 to +37 dBm, CW	CW:+37 dBm (5 W Avg.) Peak: +43 dBm	-10 to +0 dBm ±0.00 dB +0 to +40 dBm ±0.05 dB/10 dB	45 MHz - 4 GHz: 1.15 4 GHz - 12.4 GHz: 1.25 12.4 GHz - 18 GHz: 1.35	Type N(m) 50Ω	200mm (7.9 in)	37mm (1.25 in)	0.3 kg (0.7 lb)
25W Peak Power Sensor [3,5]								
80352A	45 MHz to 18 GHz +10 to +50 dBm, Peak 0.0 to +44 dBm, CW	CW: 44 dBm (25 W Avg.) Peak: +53 dBm	0.0 to +10 dBm ±dB +10 to +50 dBm ±0.05 dB/10 dB	45 MHz -6 GHz: 1.20 6 GHz - 12.4 GHz: 1.30 12.4 GHz - 18 GHz: 1.40	Type N(m) 50Ω	280mm (11.0 in)	104mm (4.1 in)	0.3 kg (0.7 lb)
50W Peak Power Sensor[3,5]								
80355A	45 MHz to 18 GHz +10 to +50 dBm, Peak 0.0 to +47 dBm, CW	CW: 47 dBm (50 W Avg.) Peak: +53 dBm	0.0 to +10 dBm ±0.00 dB +10 to +50 dBm ±0.05 dB/10 dB	45 MHz - 6 GHz: 1.25 6 GHz - 12.4 GHz: 1.35 12.4 GHz - 18 GHz: 1.45	Type N(m) 50Ω	280mm (11.0 in)	104mm (4.1 in)	0.3 kg (0.7 lb)

Notes:

1. The K connector is electrically and mechanically compatible with the APC-3.5 and SMA connectors.
2. Power coefficient equals <0.01 dB/Watt(AVG.)
3. Power coefficient equals <0.015 dB/Watt(AVG.)
4. For frequencies above 8 GHz, add power linearity to system linearity.
5. Peak operating range above CW maximum range is limited to <10% duty cycle.

1.2.1 Performance Specifications

Performance specifications describe warranted performance. Typical performance shown in italics is non-warranted. Specifications are subject to change without notice.

Rise-Time (10% to 90%, 0 dBm = 100%) < 100 ns

Fall Time (90% to 10%, 0 dBm = 100%) < 250 ns

System Linearity (50 MHz for Standard Peak Power Sensors:)
±0.13 dB from -30 to +16 dBm
±0.13 dB +(+0 dB, -0.05 dB/dB) from +16 to +20 dBm

Zero Accuracy

Applies to 80350A, 80353A and 80354;. 80351A = 100x larger, 80352A = 1000x larger

Zero Set:	< ±*1.0* µ*W*, Peak; < ±*0.05* µ*W*, CW
Zero Drift:	< ±*1.0* µ*W*, Peak < ±*0.05* µW, CW in 1 hour at constant temperature, 24 hour warmup
Noise Uncertainty:	< ±*1.0* µ*W*, Peak; < ±*0.05* µ*W*, CW at constant temperature, measured over a 1 minute interval, 24 hour warmup

Sample Delay Timing

Delay Range:	-20 ns to 104 ms
Delay Resolution:	0.5 ns
Delay Jitter:	±*2.0 ns*
Trigger Level Set Range:	
Internal:	-30 to +20 dBm
Resolution:	±*0.01 dB*
External:	0.0V to 4.0V Resolution to 0.01V
Trigger Jitter:	< ±*2.0 ns*
Settling Time:	(50% to within 3%) < 250 ns

Control Inputs and Outputs

Trigger Input:	[SMB (jack) connector] TTL External Trigger Input (absolute maximum = 10 V) 110 kΩ Impedance.
Detector Out:	[SMB (jack) connector] Monitor real time pulse waveform on an oscilloscope with this voltage output (uncalibrated) (High Impedance - Do Not Terminate)
Sample Delay:	[SMB (jack) connector] High, 5 V, between trigger and sample points. Connect to digital oscilloscope channel 2 for triggering and sample point identification (High Impedance - Do Not Terminate) Maximum cable length = 3 meters

Table 1-2. Power Sensor Cal Factor Uncertainties

Freq. (GHz)		Sum Of Uncertainties (%)[1]					Probable Uncertainties (%)[2]		
Lower	Upper	8035XA	80353A 80354A	80351A[3]	80352A[3]	80355A[3]	8035XA	80353A 80354A	80351A[3] 80352A[3] 80355A[3]
0.1	1	1.61	3.06	9.09	9.51	10.16	1.04	1.64	4.92
1	2	1.95	3.51	9.43	9.85	10.50	1.20	1.73	5.04
2	4	2.44	4.42	13.10	13.57	14.52	1.33	1.93	7.09
4	6	2.67	4.74	13.33	13.80	14.75	1.41	2.03	7.17
6	8	2.86	4.94	13.52	13.99	14.94	1.52	2.08	7.25
8	12.4	3.59	6.04	14.25	14.72	15.67	1.92	2.55	7.56
12.4	18	4.09	6.86	19.52	20.97	21.94	2.11	2.83	12.37
18	26.5	—	9.27	——	——	——	—	3.63	——
26.5	40	—	15.19	——	——	——	—	6.05	——

Notes:

1. Includes uncertainty of reference standard and transfer uncertainty. Directly traceable to NIST.
2. Square root of sum of the individual uncertainties squared (RSS).
3. Cal Factor numbers allow for 3% repeatability when connecting attenuator to sensor and 3% for attenuator measurement uncertainty and mismatch of sensor/pad combination. Attenuator frequency response is added to the Sensor Cal Factors which are stored in the sensor's EEPROM.

1.2.2 Compatible Power Meters

8541X Single Channel Universal Power Meter
8542X Dual Channel Universal Power Meter
58542 Dual Channel VXI Universal Power Meter

NOTE: If the Series 8035XA sensors will be used with a Model 8542 (dual channel) Power Meter, the 8542 must be configured to code 06 or higher, or an asterisk (*) must be appended to the code number. The code number is printed next to the serial number on the label located on the rear panel of the 8542.

2 Operation

2.1 Introduction

When a sensor is first connected to a Model 8541 or 8542 Universal Power Meter or to a Model 58542 VXIbus Universal Power Meter, it is necessary to calibrate the sensor to the meter's sensor input, using the meter's power sweep calibration system. The power meter will not allow measurements to be performed until this calibration is completed successfully. It is a good practice to repeat the calibration whenever the ambient operating temperature of the sensor varies by more than ±5 °C (±9 °F), and whenever any external connections or external loads are added or removed from the sensor. Always allow a 30 minute warm-up period before calibrating the sensor.

☛ **NOTE:** These instructions show the Series 8540 Power Meter front panel keys in brackets [ ] and menu displays in bold print.

The operational description of the 8035XA Peak Power Sensor applies to applications with either the Series 8540 Universal Power Meters (8541/2, B and C) or the Model 58542 VXIbus Universal Power Meter. Except where noted, the front panel descriptions apply only to the Series 8540 Power Meters, and SCPI command sequences apply to the Model 58542 VXIbus Power Meter.

2.2 Power Sweep Calibration

Procedures for calibrating sensors to the meter are detailed in the specific power meter manual. The 8035XA Peak Power Sensors are calibrated to the meter using the same procedure as other sensors used with the 8541/2 Power Meters or the 58542 VXI Power Meter. Connect the channel A sensor to the calibrator port, and press [ZERO/CAL].

Following the successful completion of Power Sweep Calibration, the 8541/2 will automatically display the current value of sample delay for your 8035XA Series Peak Power Sensor. If the sample delay does not appear, press [RECALL], select **PRESET**, and press [ENTER].

If you are using the dual channel 8542 Universal Power Meter, verify that only one 8035XA Series Peak Power Sensor is connected. The 8542 will automatically display peak power on one line and sample delay on the other. When two sensors are attached, the display will default to display the two power levels. Some test procedures, such as A/B ratio measurements, will be easier after performing some configuration of the display parameters. Press [MENU], select **A, B, A/B . . . B-A** with the arrow keys, and press [ENTER]. This menu will allow you to select various power measurements as well as DLYA and DLYB for the two line display.

2.2.1 5, 25, and 50 Watt Peak Power Sensors

Power Sweep Calibration of the 5, 25, and 50 W Peak Power Sensors (80351A, 80352A, and 80355A, respectively) require you to disconnect the high power attenuator before you connect the sensor directly to the front panel calibrator connector. When power sweep calibration is completed, reconnect the high power attenuator to the sensor.

Proper connector alignment is shown by small black arrows printed on the attenuator and sensor labels. The serial number on the sensor housing and the serial number on the high power attenuator should match. During manufacture, the frequency response of the attenuator is calibrated and entered into the peak power sensor EEPROM as frequency calibration factors. This technique improves the accuracy and repeatability of your measurements.

CAUTION

Do not exceed 200 mW (+23 dBm) Peak or Average. Excessive input power will damage or destroy the power sensor element.

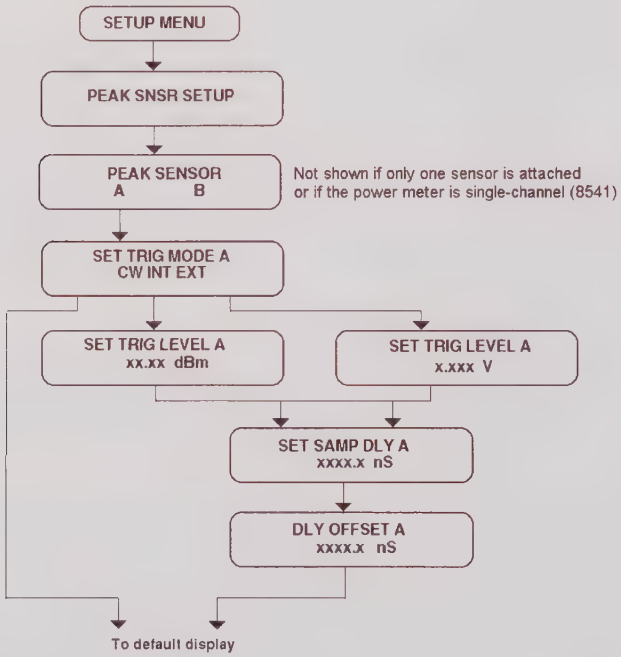


Figure 2-1. Sensor Setup Menu Tree

2.2.2 Triggering

The 8540 power meters will not display a new peak power reading until the 8035XA sensor is triggered. The default configuration is internal triggering (INT) at -20 dBm. Press [MENU], select **SETUP MENU**, select **PEAK SNSR SETUP**, (select sensor A or B if necessary), and then select INT triggering. You can then enter a new internal trigger level. Be sure that the value is 3 dB or greater below the peak power level of the signal being measured. If you are attempting to trigger at excessively low power levels, measurement repeatability and noise performance can be improved by using external (EXT) triggering.

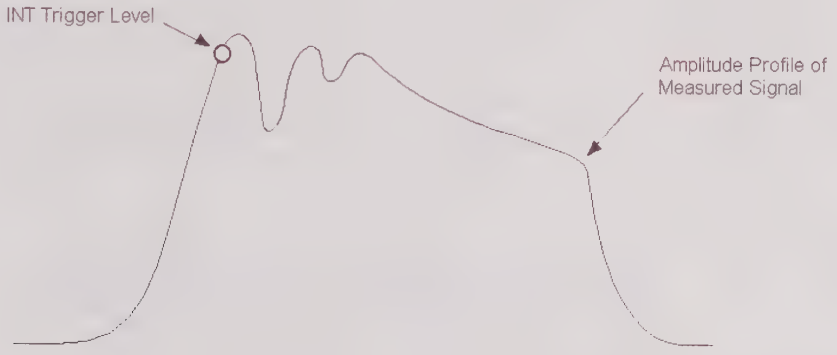


Figure 2-2. Internal Triggering Levels

2.2.3 Zeroing

Zero the sensor before taking critical measurements in the bottom 10 dB of the peak power sensor's dynamic range. For standard peak power sensors, this level is -10 dBm.

When making dual channel power measurements, zero the sensors whenever another sensor is attached or disconnected. Use the following steps:

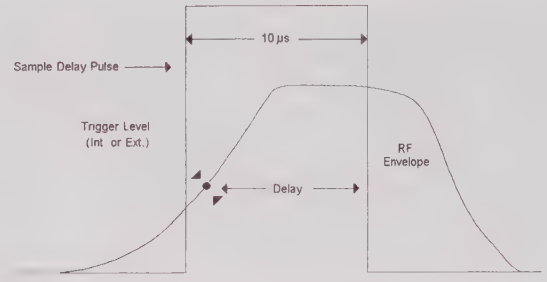
1. Turn off the RF source.
2. Press [CAL/ZERO].

The sensors will zero automatically. The 8540 power meters detect when a sensor is attached to the calibrator port. When a sensor is not attached to the power sweep calibrator, the power meter automatically initiates the zeroing procedure (if only one sensor is connected to the meter). Be sure to deactivate the RF source for zeroing. Leaving the sensor attached to your measurement test ports during zeroing properly accounts for test setup ground noise and metal to metal contact thermal EMF.

The 8035XA Series EXT trigger port is on the back of the sensor, not the power meter. A set of three SMB(f) to BNC(m) cables are included with each 8035XA Series sensor. The EXT trigger input impedance is 110 kΩ. This allows you to use TTL level signals without damaging the input circuit. However, the input impedance match might cause triggering line reflections and potential false triggering when fast (50 Ω) trigger sources are used.

This can be resolved by setting the EXT trigger level (see Figure 2-1).

The CW power measurement mode is also selected in the Peak Sensor Setup menu. CW measurements are automatically performed on a continuous basis.



This is approximately 0.0 ns delay
A built-in delay line provides at least
20 ns look-ahead capability.

58542 VXIbus Power Meter SCPI Compatible Commands

```
OUTPUT @Pwr_mtr,SENS1 TRIG:SOUR INT       !Selects Internal Triggering
OUTPUT @Pwr_mtr,SENS1 TRIG DEL 10E-06     ! Sets Sample Delay Position to 10 us
WAIT 200                                  ! Wait 200 ms for Sample Time Set
OUTPUT @Pwr_mtr,MEAS1?                    ! Take a Measurement
ENTER @Pwr_mtr:Peak_pwr_rdg
```

Figure 2-3. 80350A Sensor Timing Diagram

2.2.4 Sensor Triggering

A measurement will not be possible until the peak power sensor is triggered. The Series 8540 Power Meters will display **NO TRIG** until a valid trigger is received. The following trigger verification technique is valid for both Series 8540 and 58542 VXI Power Meters:

1. If you need to verify triggering, connect the Sample Delay output on the back of the 8035XA Series sensor to an oscilloscope using one of the SMB(plug) to BNC(m) cables provided with the sensor. Set the scope channel to dc coupling, 1.0 µs per division. Use rising edge (Normal) triggering at about 0.5 V trigger level. Set the sensor sample delay to 2.0 µs.
2. The sample delay pulse will appear each time the sensor is triggered. If a pulse does not appear on the scope display, the sensor is not triggering. Check the triggering configuration and adjust it if necessary. An analog oscilloscope may show a dim trace when the repetition rate is low.
3. A quick check that can be made on the 8540 power meter for triggering without using an oscilloscope is to press [dB/mW] twice. This will clear the current reading and display **NO TRIG** until a valid trigger is received.

2.3 Sample Delay

Sample Delay is the time value in nano-, micro-, or milliseconds that appears on the Series 8540 display after an 8035XA Series sensor has been calibrated. This is the length of time between the trigger point and the sample point on the pulsed signal. This capability allows you to measure the power level of your pulsed signal at any time point along its amplitude path. The power level displayed is the true, sampled signal level at the time position that you specified; the pulse level is not interpolated from two adjacent samples as is common in random sampling oscilloscope-type peak power meters.

Sample delay is fully adjustable from -20 ns to 100 ms. On the 8541/2 front panel, use the arrow keys to position the cursor and adjust the time values. Seven digits, four to the left of the decimal and three to the right of the decimal, can be edited in the microsecond (ns) and millisecond (ms) ranges (see Figure 2-4 for an example.) The nanosecond range allows four digits to the left of the decimal, but only a .0 or .5 to the right of the decimal.

The 0.0 ns time delay setting will be close to the trigger level when internal triggering is used. If your measurements require definition of the 0.0 ns position, use *Sample Delay Offset* to adjust for small triggering variations.

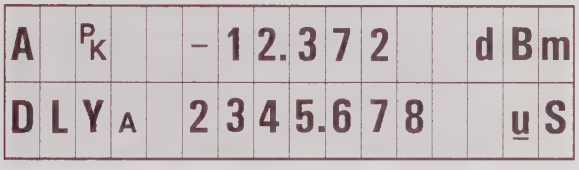


Figure 2-4. Sample Delay Adjustment Display

Full 0.5 ns resolution is always possible regardless of the front panel units display. On the millisecond ranges, small nanosecond level increments in sample delay can be performed by incrementing *Sample Dly Offset* in the Peak Sensor Setup menu tree. In addition to allowing control of small nanosecond range sample delay increments while currently displaying millisecond ranges, sample delay offsets allow you to compensate for cabling and circuit time delays in your test setup. The sensor delay is the sum of DLY_A and DLY $OFFSET_A$ (or DLY_B and DLY $OFFSET_B$)

2.3.1 Sample Delay Display

With a single peak power sensor attached, the default display after attachment and calibration of the sensor will have the power displayed on one line and the sample delay displayed on the other line. The default for channel A will be as shown in Figure 2-5.

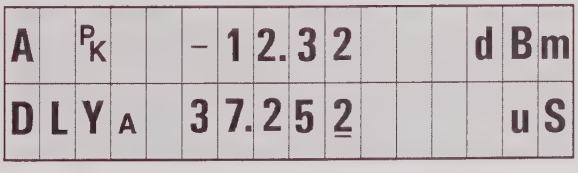


Figure 2-5. Channel A Default Sample Delay

The default for channel B will be as shown in Figure 2-6.

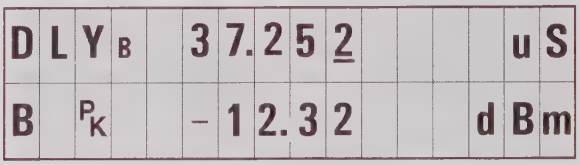


Figure 2-6. Channel B Default Sample Delay

The default displays will also be used when the meter is preset. The default for two sensors will display power readings on both lines as shown in Figure 2-7.

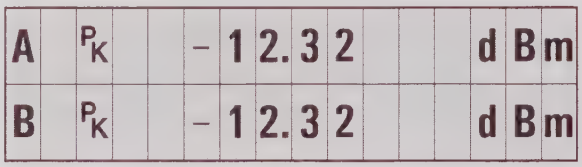


Figure 2-7. Channel A & B Default Sample Delay

If a sensor is uncalibrated, the word **UNCALIBRATED** will be displayed for the channel as shown in Figure 2-8.

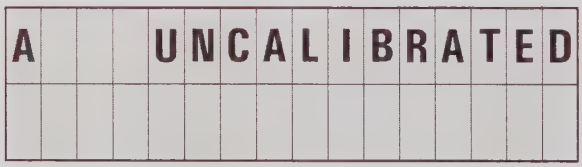


Figure 2-8. Sample Delay with Uncalibrated Sensor

The default display will be presented after attachment of a new sensor. Sample delay offsets are available for each sensor. The use of a non-zero offset will be indicated by an asterisk between the last digit and the units as shown below. The delay displayed is the sample delay before the application of any offset.

DLYA 56.354*uS

The Sample Delay display line interacts with the Min/Max display line. If Min/Max is turned on for a line that Sample Delay was tracking, Min/Max will be displayed instead of Sample Delay.

2.3.2 Setting Sample Delay

The sample delay can be set from two locations within the menu structure. One location is at the default display where sample delay information is displayed. The other is in the menu structure where the peak sensor setup is configured.

Sample Delay Operation

You will be presented with a display with a decimal point fixed in the display. Normally, four digits are available to the left of the decimal point and three digits to the right as shown below. Leading zeros will be suppressed.

```
XXXX.XXX uS
```

When the units are set to nS, only one digit will be available to the right of the decimal.

The right and left arrow keys move a cursor to select a digit or unit to be changed. The cursor will stop only at valid digit or unit locations (valid digits are shown by ^ below). The cursor will stop under valid blank spaces so that large numbers can be entered quickly.

```
XXXX.XXX uS
^^^^ ^^^ ^
```

Press the up key to increment the digit value by 1, or the down key to decrement the digit value by 1. If a digit is incremented past 9, a carry is propagated to the next higher digit (odometer mode). Similarly, if a digit is decremented past 0, a borrow will be made from the next higher digit. You can decrement the delay to a negative number.

An exception is made when the cursor is moved to the 10ths of nanoseconds range. The up or down arrows will change the display in .5 nS increments. This is the maximum resolution of the sensor.

Press the up or down keys while the cursor is under the units display to cycle through the units. You will be offered a choice of nS, µS, or mS. The units display does not wrap around.

The units selected will be used in all displays for the delay for the sensor to which they are assigned.

If a peak measurement parameter is changed, e.g. sample delay or trigger level, the power display will display **NO TRIG** (see Figure 2-9) until a new measurement is made with the new parameters in effect. If the sensor triggers quickly, the message may not be seen. In the TR2 mode, the display may show **MEAS*** with the asterisk lines rotating as each measurement is made.

```
A      NO TRIG      dBm
DLYA    37.252      uS
```

Figure 2-9. Sample Delay with No Trigger Display

The GPIB will return numerical data in the No Trig state, depending on the GPIB measurement mode. See the GPIB Commands in Section 2.4 for more details on Trigger Modes.

2.3.3 Sample Delay Limits

There is no automatic units scaling for the sample display. You can enter any number up to 9999.999 and then set the units, with the exception of the nS range, which allows only one digit to the right of the decimal. If the sample delay plus the offset exceed the range of the attached sensor, the **S** at the end of the line will be replaced with an arrow indicating a range error (see Figure 2-10). An up arrow indicates that a delay is too high, a down arrow indicates that a delay is too low.

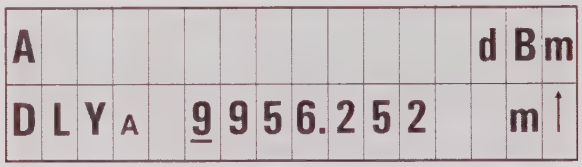


Figure 2-10. Sample Delay Over-range Indication

When the arrow keys are used to change the units, the digits in the display will simply use the new units. The only exception is going from µS to nS. The digits to the right of the decimal point will be reduced to one digit, and that last digit will be either 0 or 5 as shown in the following example:

Starting Display	Action	Resulting Display
15.678 µS	↓	15.5 nS

Setting Delay from the Default Display

A cursor will be displayed on the sample delay in the default display. When you change the sample delay by pressing an up or down arrow key, the associated sensor will be immediately programmed with the new delay. The power display may be replaced with **NO TRIG** until a new power measurement can be made with the new sample delay.

If an over-range sample delay is entered, no measurement will be made until the over-range condition is corrected (over-range includes delay plus offset).

If there is more than one delay display line, the left and right arrows will move the cursor off the end of one display line and onto the next.

Setting Delay from the Peak Setup Menu

The cursor will be available immediately upon entering this menu. The sensor will not be updated with the new delay setting until the peak menu sequence is completed. This requires selecting the trigger mode, setting the trigger level, setting the sample delay, and setting the sample delay offset. The display will exit to the default measurement display when you press [ENTER] on the last menu in the sequence.

2.3.4 Setting Sample Delay Offset

The sample delay offset is settable from the menu following the **SET SAMP DLY** menu (see the Menu Tree in Figure 2-1). The method to enter the delay offset will be the same as the method to enter the sample delay. You can change a set of digits (XXXX.XXX), plus units.

The offset will be range checked together with the sample delay so that the total of sample delay plus offset does not exceed the range of the sensor. If the range of the sensor is exceeded, a beep may sound and an arrow will replace the S at the end of the line (see Figure 2-11) to indicate an out of range condition. If you exit the menu without correcting the out of range condition, no power measurement will be made.

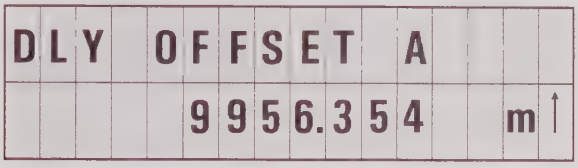


Figure 2-11. Sample Delay Over-Range Offset Display

For example, if the max delay available from a sensor is 100 mS and the sample delay is set to 75 mS, the maximum offset permitted is 25 mS. Anything larger will cause an arrow to be displayed.

Each sensor has its own delay offset parameter.

2.3.5 Single Peak Sample Measurements

Measurements for a peak sensor will be performed over a number of single samples. A single sample is defined as follows:

1. The sensor is armed.
2. A pulse is triggered and sampled by the sensor. The sensor informs the meter via handshaking that a measurement voltage is available.
3. The meter measures the voltage and computes the power from this one trigger sample.

When averaging is turned on, the averaging will be done over a number of single samples. Auto averaging will use an increasing averaging number as the power level being measured declines. For example, the number of samples required for measurements at 20 dBm is 1. At -20 dBm, the number of samples will be about 32 (this could change depending on mode or software version).

2.3.6 Real Time Pulse Profile and Sample Position Display

The Detector Out connector on the rear of the 8035XA Series Peak Power Sensor can be connected to any common oscilloscope for a real-time amplitude profile of your signal, delayed by about 120 ns.

Connect the SMB to BNC cables to your oscilloscope (digital scope preferred - especially for sample delay setting >500 µs) as shown in Figure 2-12.

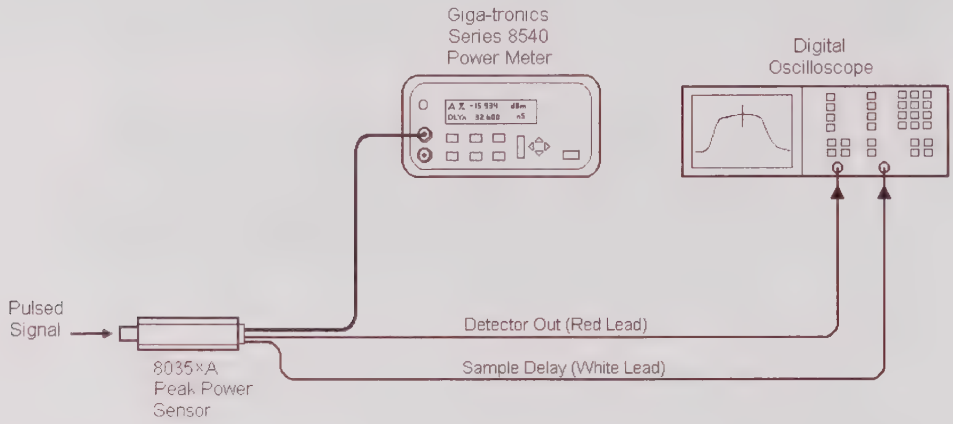


Figure 2-12. Pulse Profile and Sample Delay Test Setup

Use the Sample Delay output as an oscilloscope trigger source. This waveform rises at the trigger point and falls at the sample point; thus, it provides both a stable scope trigger source and a precise indicator of the trigger point and sample point.

The time length of the sample delay pulse is the sum of the sample delay which is displayed on the Series 8540 power meter front panel, and the sample delay offset which is available through the menu.

2.3.7 Sample Delay Offset

In addition to compensating for delay line triggering variations or external triggering cables, sample delay offset can be used to set a 0.0 ns time reference point after the trigger point (see Figure 2-13).

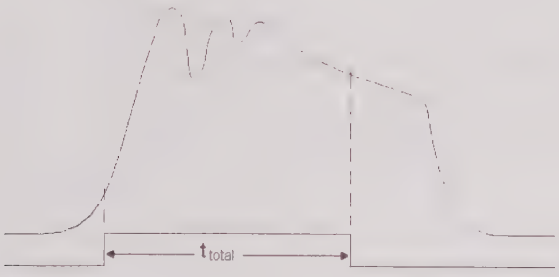


Figure 2-13. Sample Delay

The use of a digital oscilloscope can permit better viewing of data. There are two small markers injected onto this waveform. The first is a small triggering marker which is added slightly after the trigger point. The second marker on the waveform is the sample marker. The sample marker is located slightly behind the actual sample point. There may be small markers at the end of the sample transfer and when the trigger signal occurs. Because the visibility of these markers varies greatly with signal level and horizontal sweep rate, the use of the SAMPLE DELAY output is recommended.

In Figure 2-14, triggering occurs at the frame start of a pulsed TDMA communications signal. The trigger level is set such that triggering can only occur on the highest amplitude pulse; this provides stable triggering. A sample delay offset is used to set a 0.0 ns reference point at the start of the third data burst pulse.

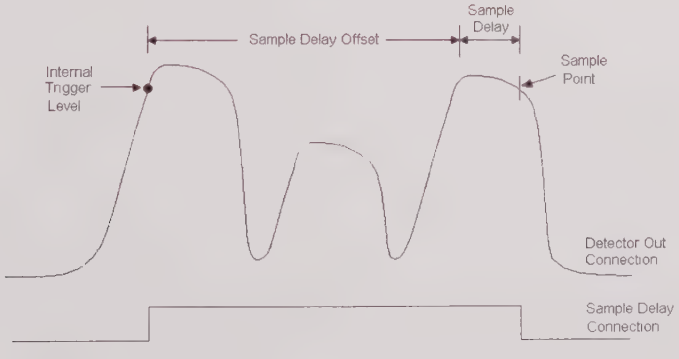


Figure 2-14. Using SD to Offset a 0 ns Time Reference

2.3.8 Measuring Pulse Droop

Pulse characteristics such as droop, ripple, and overshoot can be measured quickly using referenced measurements. This involves the use of the front panel REL key for the Series 8540 power meter users, or the CALC#:REF:COLL function for 58542 power meters.

1. Connect the 8035XA Peak Power Sensor to the power meter and the CALIBRATOR output.
2. Press [CAL/ZERO] to calibrate the sensor to the meter.
3. Upon successful completion of power sweep calibration, connect the sensor to a pulsed signal source. The power level must be above the trigger level.
4. Connect the 8035XA Detector Out and Sample Delay leads to a digital oscilloscope.
5. Set the sample delay (DLYA) to the t_1 position just after the rising edge as shown in Figure 2-15.
6. Press [REL]. The display should now read approximately 0.00 dBm or 100%.
7. Set the sample delay to the t_2 position just before the falling edge of the pulse.

The display is now reading the pulse-top amplitude variation.

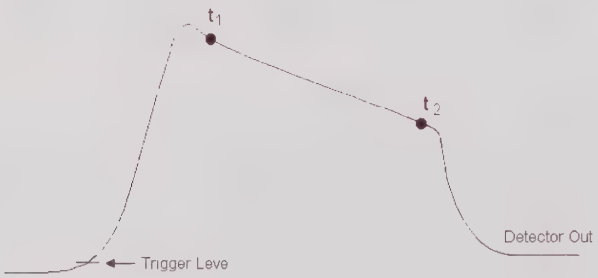


Figure 2-15. SD Setting for Measuring Pulse Droop

2.3.9 Measuring 3 dB Pulse Width

Pulse width and other pulse timing parameters can be measured using the REL key and the sample delay offset control (see Figure 2-16).

1. Preset the delay offset to 0 nS.
2. Set the sample delay equal to about half the pulse width.
3. Press [REL] to set the 0.0 dB reference level (100% for Watts display).
4. Set the sample delay to a position on the rising edge of the pulse. Increment or decrement the sample delay value until the power level display reads approximately -3.00 dBr.
5. Remember or write down the sample delay value.
6. Press [MENU], and use the up/down arrow keys to display **SETUP MENU**. Press [ENTER]. Select **PEAK SNSR SETUP**, then select the current triggering method (INT or EXT). When **DLY Offset** appears, set the offset value to the same time value from Step 4. This sets the 3 dB down time point to a 0.0 ns reference position.
7. Press [ENTER] to return to the measurement display.
8. Set the sample delay to a position on the falling edge of the pulse. Increment or decrement the sample delay value until the display again reads approximately -3.00 dBr.

The sample delay currently displayed is the signal's 3 dB pulse width.

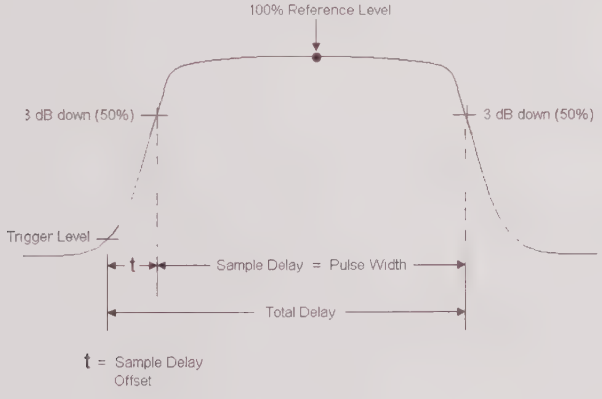


Figure 2-16. Using SD to Measure a 3 dB Pulse Width

2.3.10 Measuring Rise-Time

Rise time measurements can be performed using a technique similar to the pulse width measurement. This example uses a linear Watts display readout rather than the more common logarithmic dBm readout for convenient identification of the 10% and 90% levels.

1. Preset the delay offset to 0 ns.
2. Press [dBm/mW] to obtain a linear, Watt, display readout.
3. Set the sample delay equal to about half the pulse width.
4. Press [REL] to set the 100% reference level.
5. Set the sample delay to a position on the rising edge of the pulse. Increment or decrement the sample delay value until the power level display reads approximately 10%.
6. Remember or write down the sample delay value.
7. Press [MENU]. Select **SETUP MENU** then **PEAK SNSR SETUP**. Proceed to the **SAMPLE DELAY OFFSET** selection. Set the offset value to the same value from Step 6.
8. Return to the measurement display and increment the sample delay until the display reads approximately 90%.

The sample delay currently displayed is the 10% to 90% rise time.

2.4 GPIB Commands

These commands supplement the commands given in the Series 8540 Universal Power Meter Operating and Maintenance Manual.

2.4.1 Setting Trigger Modes

These commands set the trigger method for the 8035XA sensor. The sensor can be set to trigger on the rising RF envelope of the power signal. This is the internal trigger mode. An external TTL trigger can be used, or the sensor can "free run" and allow a CW measurement mode with no trigger required.

The terms digital filter (as used in some instrument instructions) and averaging buffer (as used here) are interchangeable.

Examples:

```
OUTPUT 713;PEAK A INT TRIG -10.00      ! Configure sensor A for internal trigger at
                                       ! -10.00 dBm trigger level

OUTPUT 713;PEAK B EXT TRIG 1.50        ! Configure sensor B for external trigger at
                                       ! 1.50 Vdc trigger level

OUTPUT 713;PEAK A CW       ! Configure sensor A for CW measurements
```

In this example, the address 713 means "Type 7" GPIB instrument, and address "13" for the power meter. The GPIB control command (the portion to the left of the semicolon) may vary.

Trigger Modes With a Peak Sensor

Examples:

```
OUTPUT 713;TR3      ! Last measured value will be returned

OUTPUT 713;TR2      ! Refill averaging buffer before measurement display

OUTPUT 713;TR1      ! Wait for trigger before returning measurement

OUTPUT 713;TR0      ! Measure, but no display
```

TR0 The meter will measure power, but the display of measured data will be suppressed and the GPIB bus will not be updated with measurement data.

TR1 This mode will wait until the sensor triggers before returning a measurement. The measurement returned will be after the application of any averaging. The display for the channel will follow the TR1 mode. When TR1 is received over the bus, **NO TRIG** will be displayed until the sensor has triggered and measurement data is available.

TR2 This mode will wait until enough measurements are made to completely refill the averaging buffer. The measurement returned will be the average of all measurements in the buffer. **MEAS*** will display with one of the asterisk lines rotating for each measurement) while the averaging buffer is being filled.

TR3 The last measured value will be returned. This mode will not wait for the peak sensor to trigger.

2.4.2 Setting Delays

When the sensor is configured for internal triggering, the delay from trigger to measurement sample must be set. The valid range of delays is -20 ns to 100 ms, expressed in a floating point number. The smallest delay increment is 0.5 ns. Setting delays in CW trigger mode are invalid and ignored.

Examples:

```
OUTPUT 713;PEAK A DELAY 1.20E-6      ! Configure sensor A for a delay of 1.20 µs

OUTPUT 713;PEAK B DELAY 33.5E-9      ! Configure sensor B for a delay of 33.5 ns
```

The offset command adds a known offset to the trigger delay value. The actual value of delay would be the DELAY set plus the OFFSET set. The default value of offset is 0. The valid range of offset is -20 ns to 100 ms, expressed in a floating point number.

Example:

```
OUTPUT 713;PEAK A OFFSET 1.00E-6     ! Configure sensor A for a delay offset of 1.00 µs
```

2.4.3 Reading Values

These commands read the current settings of delay or offset.

Examples:

```
OUTPUT 713;PEAK A?        ! Query the current sensor A trigger setting

ENTER 713;TRIG$           ! query the trigger mode setting of the sensor, and return:

CW
or
INT_TRIG
or
EXT_TRIG

OUTPUT 713;PEAK A DELAY?        ! Query the current sensor A delay setting

ENTER 713;Delay

OUTPUT 713;PEAK B OFFSET?       ! Query the current sensor B offset

ENTER 713;Offset
```

2.4.4 Commands for the 58542

The following peak power sensor GPIB commands are used with the Model 58542 VXI Universal Power Meter. Refer also to the Model 58542 Operation and Maintenance Manual for additional details.

SENSe<sensor 1 or 2>:TRIGger:SOURce<INTernal|EXTernal|CW>

This command sets the sensor (1 or 2) peak trigger mode to either the INTernal, EXTernal, or CW mode.

SENSe<sensor 1 or 2>:TRIGger:DELay[:MAGnitude]<1e-6, -20e-9,100e-3>

This command sets the sensor (1 or 2) peak delay value to any desired time from -20e-9 to 100e-3 seconds, with 1e-6 seconds being the default setting.

SENSe<sensor 1 or 2>TRIGger:OFFSet[:MAGnitude]<0, -20e-9,100e-3>

This command sets the sensor (1 or 2) trigger offset time to any desired value from -20e-9 to 100e-3 seconds, with 0 seconds being the default setting.

SENSe<sensor 1 or 2>TRIGger:LEVel[:MAGnitude]<-10 dBm, -30 dBm, 20 dBm>

When the INTernal trigger mode is in use, this command sets the trigger level to any desired power level setting from -30 to +20 dBm. Default is -20 dBm.

SENSe<sensor 1 or 2>TRIGger:LEVel[:MAGnitude]<1.700, -0.100, 5.000>

When the EXTernal trigger mode is in use, this command sets the trigger level to any desired voltage level from -0.100 to 5.000 V. Default is 1.700 V.

3

Theory of Operation

3.1 Introduction

This chapter describes the electrical operation of the Series 8035XA Peak Power Sensors.

Refer to the block diagram in Figure 3-1 to follow the general function of the sensor. The RF signal is rectified in the sensor element, and the video envelope is buffered and delayed by the input amplifier and delay buffers. This buffered envelope is available at the Detector Out connector. The Track and Hold (T&H) function tracks and follows the signal and then holds it for hundreds of microseconds. The Sample and Hold (S&H) function acquires the S&H output and holds it for hundreds of milliseconds.

The timing circuitry generates the sample pulses from the trigger input or, if the sensor is in the free run mode, from an internal oscillator.

The block diagrams, circuit descriptions, and the troubleshooting information in Chapter 4 are written around the circuit test points. The delay lines shown in Figure 3-1 are illustrated in the Analog Timing Diagram in Figure 3-3. Delay lines match the delay through the analog channel to the sample point, and the delay through the timing circuitry to the sample generator. Since fixed lumped constant delay lines are used, the match is not perfect. The delay through the INTernal trigger is slightly longer than the delay through the EXTernal trigger due to the delay of the input differential preamp.

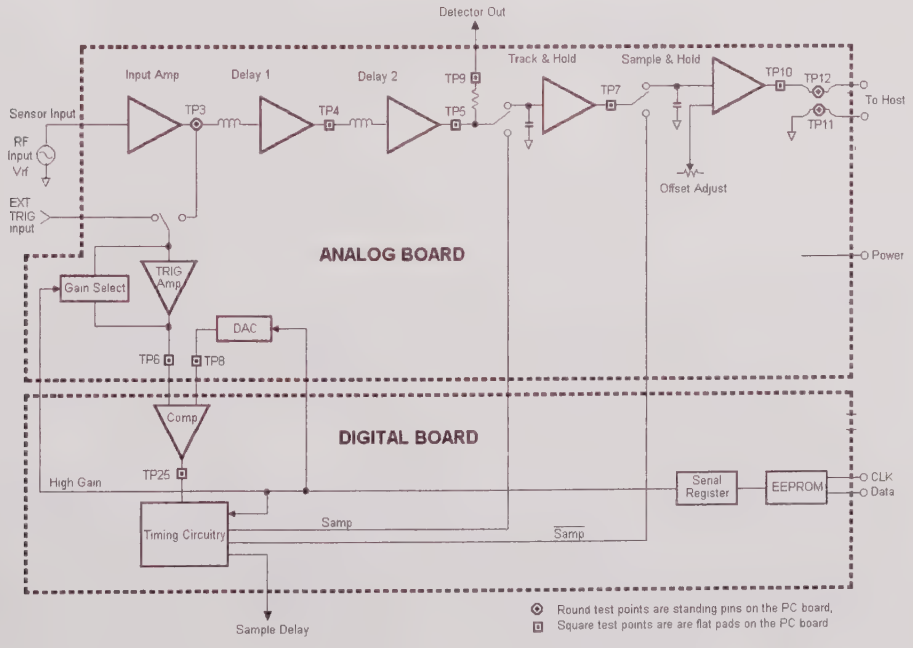


Figure 3-1. 8035XA High Level Block Diagram

3.2 Analog Assembly Description

Refer to Figure 3-2, the Analog Timing Diagram in Figure 3-3, and schematic diagram #21351 in Chapter 7 to follow the discussion of the Analog PC assembly circuit operation.

The rectified signal from the detector goes into the resistors R1 or R2 (TP1 and TP2). The signal sees 2 kΩ to ground from either input (the negative input sees 2 kΩ to a virtual ground inside R100). R3 helps to balance the input bias current. U1 and U2 delay the signal so the trigger output and video output may be viewed close together. U4 and U5 are buffers for the delay lines (TP3).

U10C and U7A provide a fast Track and Hold (T&H). U7A buffers the T&H capacitor C21, and U7B buffers the S&H capacitors, C1 & C2.

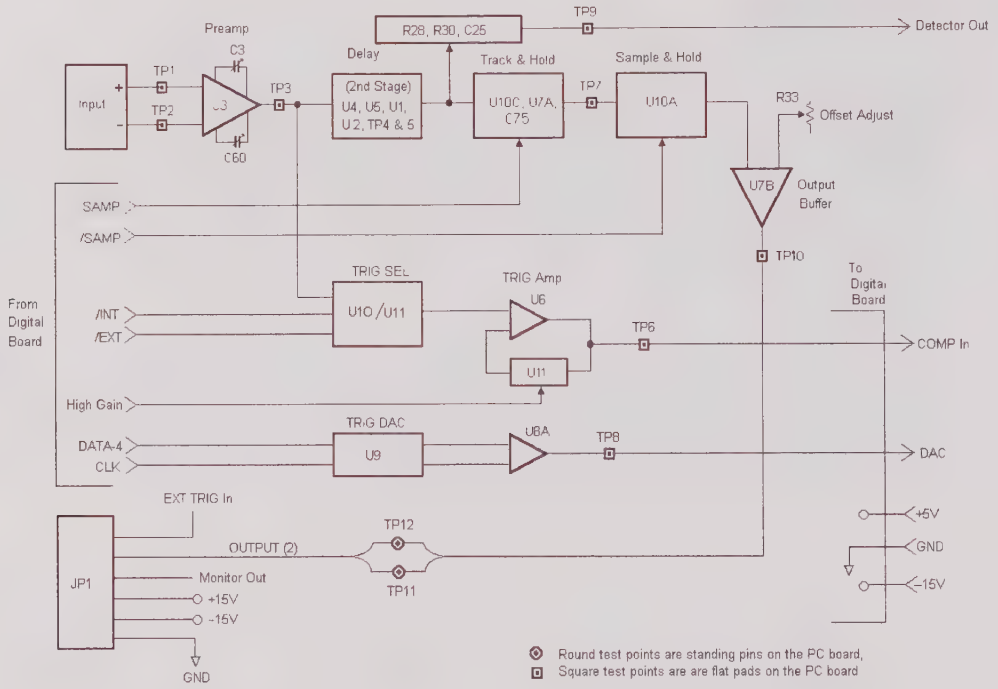


Figure 3-2. Analog PC Assembly Block Diagram

A track and hold differs from a sample and hold in the manner in which the signal prior to the hold is manipulated. In a sample and hold, the sample gate turns on and the holding capacitor is charged to the signal potential, then the sample gate turns off and the hold capacitor maintains the value of the input at the time of the sample. In a track and hold circuit, the voltage on the hold capacitor is the same as the input (tracks) until the track gate goes off, after which the level is held until the track goes on and the hold capacitor again follows the input.

The INTernal or EXTernal trigger source is selected by U10D and U11A. U11B functions as an inverter for HIGHGAIN. U6 amplifies the trigger signal by 1 or 41. Trigger DAC U9 is loaded with a count from the serial chain. The DAC needs the data signal held after the clock for at least 80 ns. A2R12 and A2C25 on the Digital board take care of that requirement. That count gets translated into a voltage between -0.1 V and about +5 V by U8A. Digital board comparator A2U18 provides the TRIG-IN pulse (A2TP25). A2R42 provides hysteresis for A2U18.

NOTE: All times shown in Figure 3-3 are referenced to TP3, and are not to scale.

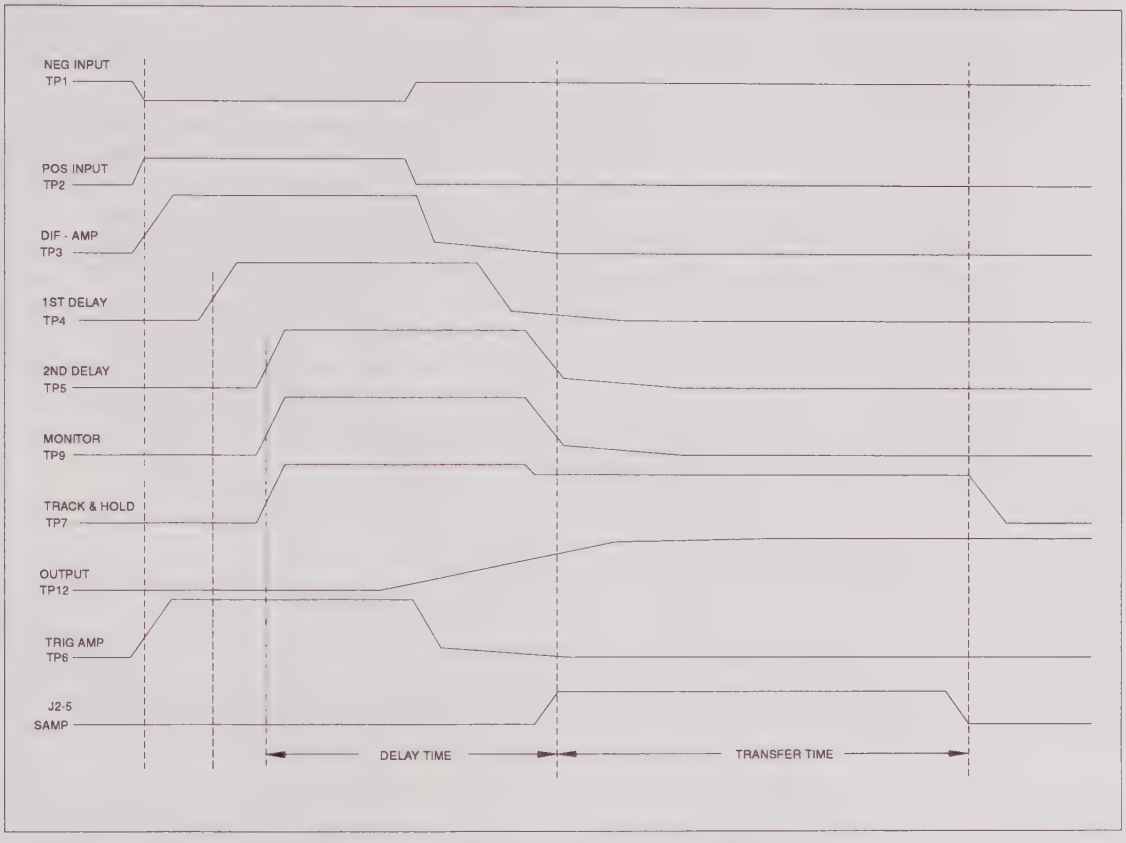


Figure 3-3. Analog Circuit Timing Diagram

3.3 Digital Assembly Description

3.3.1 Overview

Refer to the Digital PC block diagram in Figure 3-4, and the Digital Timing Diagrams in Figures 3-5, 3-6 and 3-7.

The digital board provides the timing functions for delays between a small negative time (with respect to either the video monitor, or the sampled pulse) and >100 ms. In the CW mode, the digital board is not reset, but continues to generate clocks and samples at about 70 µs intervals. In either the INTernal or EXTernal modes, an acquisition is requested by the host (the power meter to which the sensor is connected is the host) which causes READY to be set. When an input trigger is received, it is latched and delayed by a FINE delay, and then starts a 10-MHz clock. The clock increments a COARSE counter until it reaches FFFFF or all ones, and then outputs a Ripple Carry Out (RCO) signal. This is latched as SAMPle, delayed by one count, and then compared to the count of 51µs out of the counter to allow the SAMPle to be 51µs wide. Then the COARSE counter is reLOADed for about 5µs, the 10-MHz clock is stopped for about 5µs, the $\overline{\text{LOAD}}$ unasserted, and the TRIGger, SAMPle, and READY flip-flops reset for about 1µs. A 48-bit serial stream provides the 80350A configuration information. When the serial clock is running, CLKHOLD resets the TRIG loop and loads the counter.

NOTE: Over-score indicates a logic-NOT condition.

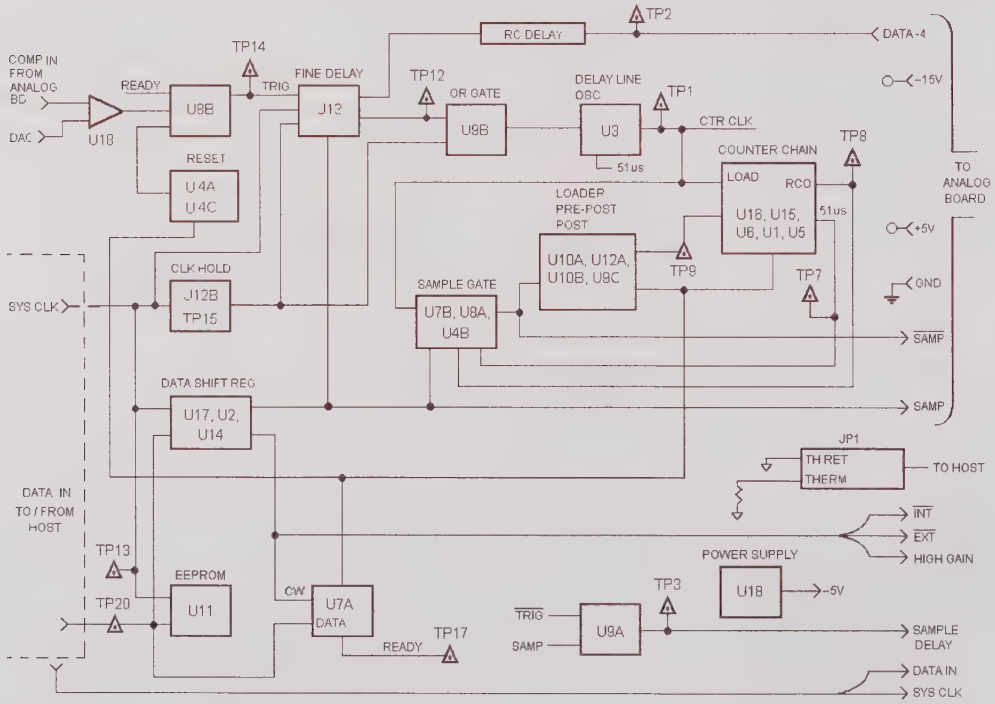


Figure 3-4. Digital PC Assembly Block Diagram

3.3.2 Description

When READY (TP17) is true, U8B flip-flop (TP14 - TRIG) is set after TRIG-IN goes high. U13 delays the TRIGgered signal by a delay programmed in 1/2 ns intervals. U3 is a 10-MHz gated delay line oscillator which, when enabled by the fine delay, clocks (TP1) the coarse counter U1, U5, U6, U15 and U16, and the SAMPLE flip-flops U7B and U8A. Unlike conventional oscillators which free run, a gated delay line oscillator beginning time period is the same length as all of its other time periods with the possible exception of the last period when enable is unasserted. When RCO (TP8) is true for one clock cycle (ignores pulses less than 100 ns), U7B is latched as SAMPle (TP11). SAMPle is delayed by one count because 51µs (TP7) can still be true when SAMPle goes true, and AND'd with 51µs from U1. When true (when SAMPle has been on for 51µs), the U10A loader receives a negative edge clock. $\overline{\text{LOAD}}$ for the COARSE counter is asserted and held low via U9C, R34, and C27 until the 10-MHz clock (U3) stops via U12A, U10B, (TP9), U4A, and U4C. Note the sequence:

1. CTR-CLK (TP1) must be running.
2. $\overline{\text{LOAD-CTR}}$ (TP9) goes low and stays low while CTR-CLK continues for at least one cycle. This loads the COARSE counter.
3. CTR-CLK (TP1) stops. $\overline{\text{LOAD-CTR}}$ is still low. CTR-CLK continues in the CW mode.
4. $\overline{\text{LOAD-CTR}}$ returns high at least 200 ns before $\overline{\text{POST}}$ (TP5) returns high. The same FINE delay which delayed the start of the 10-MHz clock now works against turning the 10-MHz clock off.

SAMP (TP11) going high turns the Track and Hold (T&H) to Hold on the Analog board, and turns the Sample and Hold (S&H) to Sample. When it goes low, the T&H goes back to tracking the input and the S&H holds the sampled signal level. U10B POST (TP5), the major reset circuit, resets READY (TP17) to prevent the trigger circuit from restarting, continues to reset TRIG (TP14) (except in the CW mode) which started in PRE-POST, and resets SAMP (TP11). When the host has read the data, the DATA-IN line is momentarily pulsed low by the host which sets READY (TP17), and pulls the DATA-IN line (TP20) low via diode CR3. Note that the DATA-IN — READY handshake does not occur in the CW mode.

EEPROM U11 stores the sensor type, serial number, and calibration constants. This IC is only accessed by the host. Except for device start and stop conditions, DATA-IN can change states only when CLK is low. After device stop has been sent, the host sends a 48-bit serial stream to set up the 80350A sensor. Four zeros are sent followed by the 12 DAC trigger bits, followed by the fine counter 8 bits, 20 bits for the COARSE counter (with FFFFF meaning zero delay), and finally the 4 control bits (INTernal, EXTernal, CW, and HIGHGAIN). Because the serial DAC on the ANALOG board has a data hold requirement of 80 ns minimum, DATA-4 (TP2) must be delayed by R12 and C25.

Incoming CLK turns on U3 (10 MHz - TP1) and U9C ($\overline{\text{LOAD}}$) (TP9) via U12B (CLKHOLD) which loads the COARSE counter with the new delay.

The test points are essentially in order across the length of both the Analog and Digital boards in the approximate order of signal progression to aid in troubleshooting. In addition, the between-the-board connectors can be used as test points.

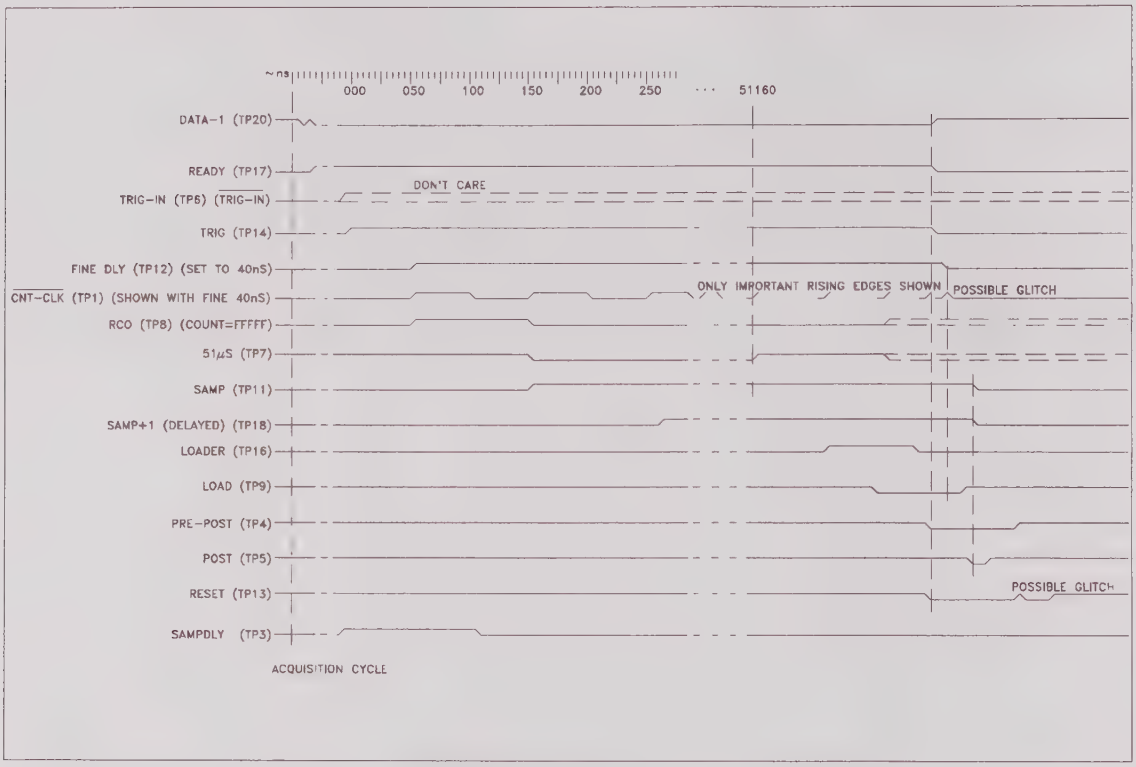


Figure 3-5. Digital Timing Diagram, INT/EXT Trig Mode

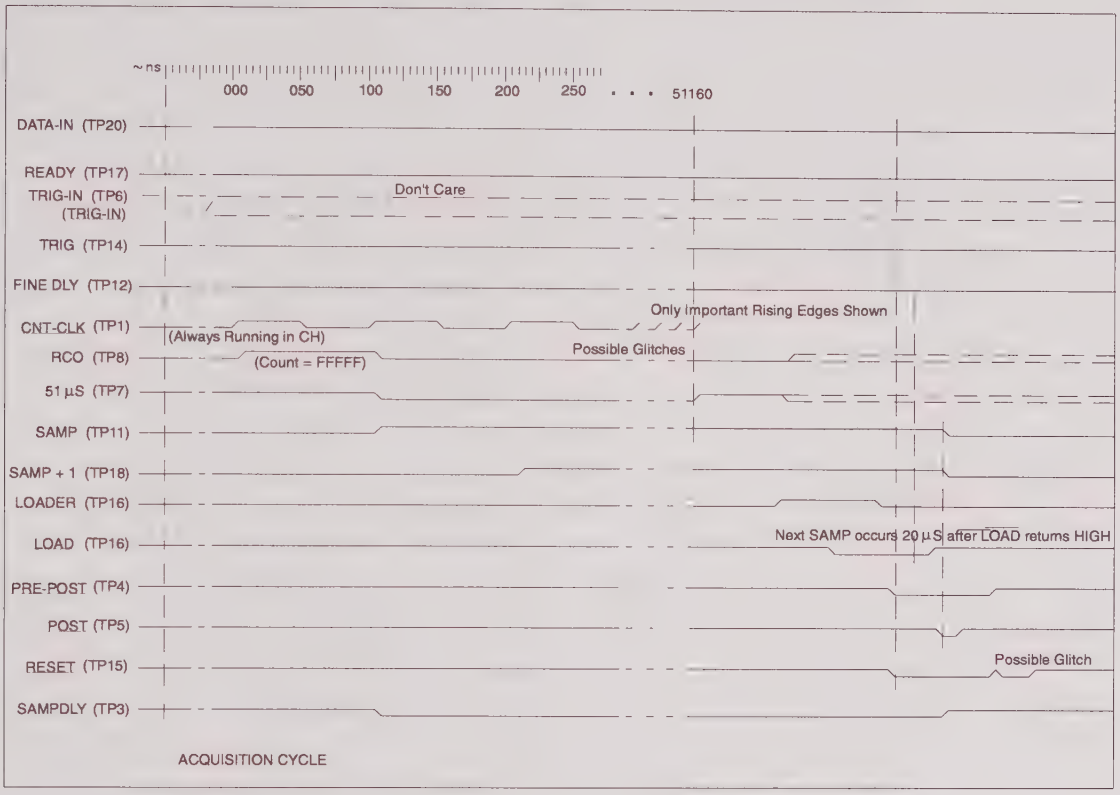


Figure 3-6. Digital Timing Diagram, CW Mode

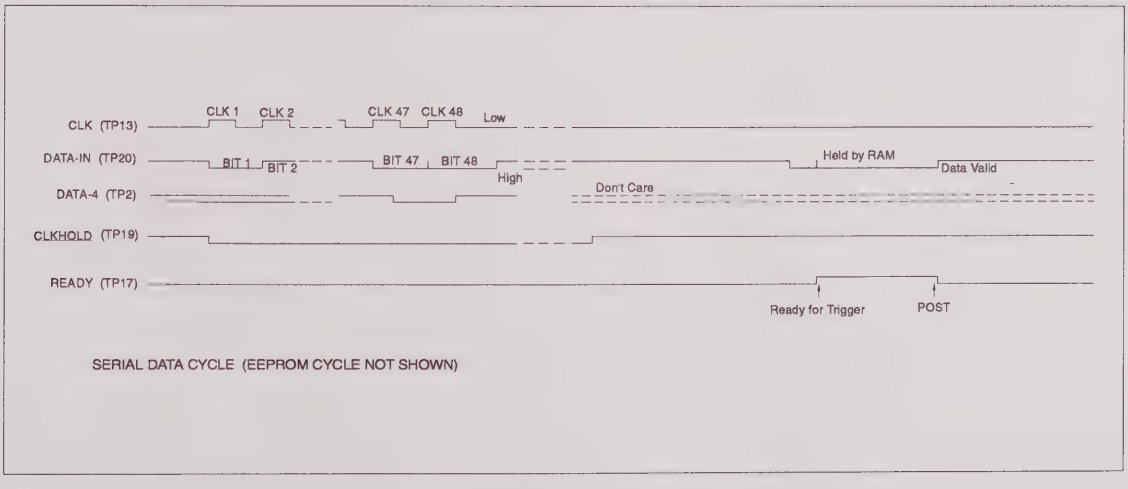


Figure 3-7. Digital Serial Data Cycle Timing Diagram

4

Performance Verification Tests

4.1 Introduction

Information in this section is useful for periodic evaluation of the performance and/or receiving inspection testing of the 8035XA Series Peak Power Sensors. These tests assume that the operation of the particular 8540 Series Power Meter or Model 58542 VXI Power Meter being used with the sensor has already been verified as described in the power meter's Operating & Maintenance Manual. Verifying the Frequency Cal factors stored in the sensor EEPROM is not described in this procedure. If necessary, the Cal Factors can be verified with a Vector Network Analyzer using similar procedures as for standard power meter sensors.

Before starting these tests, connect the Peak Power Sensor(s) to the 8541/8542 meter, and allow at least 24 hours for warm-up. These tests will only be valid if the power meter and the sensor(s) have been calibrated at an ambient temperature between +20 °C and +30 °C (+68 °F to +86 °F), and are operating within ±3 °C (±5.4 °F) of the calibration temperature.

4.2 Equipment Required

The following items of test equipment (or equivalent) are required for completing the Performance Tests described in this chapter.

Description	Instrument Model	Requirements
Power Meter	Giga-tronics 8540 Series (or VXI)	Compatible with 8035XA Sensor
RF Source	Wavetek Model 2510 (Hi Power Opt.)	+20 dBm @ 50 MHz
Oscilloscope (DSO)	LeCroy 9400	Bandwidth 125 MHz
CW Thermistor Power Meter	HP Model 432B	Inst. Acc. of at least 0.5%
Thermistor Mount	HP 478A-H75	0 to +10 dBm range <1.1 SWR
Pulse Generator	Wavetek Model 278	Delay and pulse width control
Attenuators 10, 20, 30 and 40 dBm	Weinschel Model AC118A-90-33	Type N, 0.5 dB accuracy VSWR <1.20 @ 50 MHz
Directional Coupler	Narda Model 3002, 10 dB	
Low Pass Filter	Integrated Microwave Model 904 881	>50 dB Atten. @ 100 MHz

4.3 Power Linearity Test

The linearity will be tested in a series of 10 dB steps over the range of the sensor. At low power levels, the measurements will reflect the uncertainty due the noise and zeroing specifications. Make a copy of the Performance Verification Data Sheets at the end of this chapter to record the data from this test.

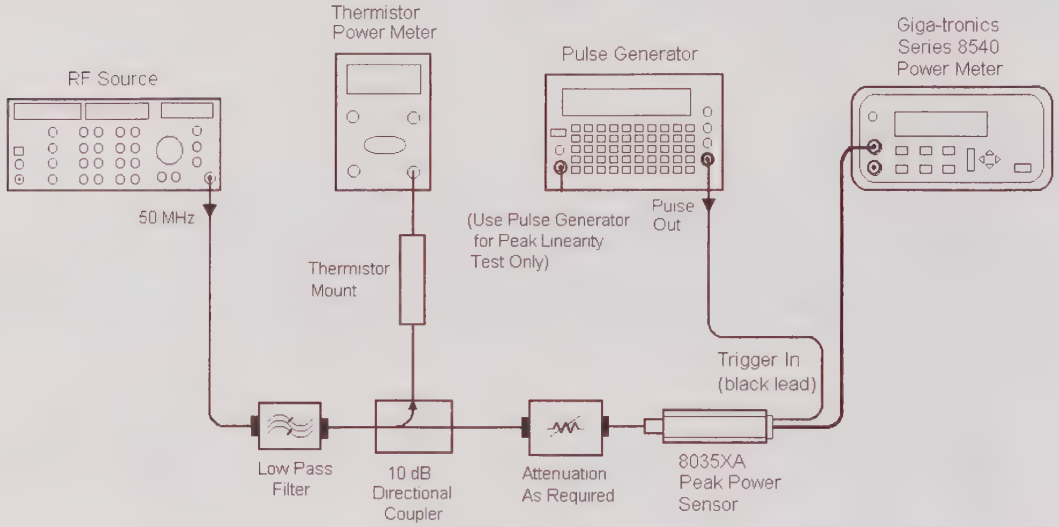


Figure 4-1. Power Linearity Test Setup

4.3.1 CW Linearity Test

1. Connect the test setup as shown in Figure 4-1. Set the RF source to 50 MHz. Be sure the sensor has had at least 24 hours of warm-up time. To take accurate measurements, it is essential to take out any drift that might occur.
   a. Calibrate the Peak Power Sensor as described in the applicable 8541/2 Operation and Maintenance manual.
   b. Place the 8541/2 power meter in the CW mode.
   c. Set the 8541/2 to display power in linear units (mW).
   d. Set Averaging to 4.
   e. Set the CW frequency to 50 MHz.
2. Start with no attenuation between the coupler and the Peak Power Sensor. Record results on the first row of the linearity data recording sheet.
3. Turn the RF source off and zero the Peak Power Sensor by pressing [ZERO/CAL].
4. Zero the thermistor power meter.
5. Turn the RF source on.
6. Adjust the RF source until the thermistor power meter reads 10.0 mW ±0.25 mW.

7. Record the thermistor power meter reading, P1, and the 8541/2 reading, R1, on the data sheet.
8. Adjust the RF source until the thermistor power meter reads 1.0 mW ±0.025 mW.
9. Record the power meter reading, P2, and the 8541/2 reading, R2, on the data sheet.
10. Calculate and record the reference power ratio P1/P2, and the DUT reading ratio, R1/R2.
11. Calculate and record the Linearity Error using the formula:

$$Linearity\ Error = \left[\left(\frac{R1}{R2}\right) \Big/ \left(\frac{P1}{P2}\right) - 1\right] x\ 100$$

12. Add an additional -10 dB of attenuation between the coupler and the Peak Power Sensor and repeat Steps 3 through 9, filling in the 10 dB through 40 dB (through 30 dB in Peak Mode) attenuation rows of the data sheet. On these rows, add the current linearity error to the accumulated linearity error in the row above. Verify that this accumulated error is less than the specified values given on the data sheet.

4.3.2 Peak Linearity Test

Set the sensor to EXT, 1.7 V, 10 µs, 0 offset, and connect the TRIGGER IN (black lead) to the pulse generator. Set the pulse generator to 1 kHz, and repeat all of the steps in the CW Linearity Test for this Peak Linearity verification test. Place the 8540 power meter in the EXT Trigger Mode instead of the CW mode. Record the readings on the Peak Linearity Data recording sheet at the end of this chapter.

4.4 Trigger Modes Test

Connect the test setup as shown in Figure 4-2. Set the pulse generator for a 100 Hz pulse repetition frequency. Set the RF source to make a 2 µs wide pulse. Set the 8541/2 to display power in linear units (mW). Set the source to a frequency of 50 MHz with a power level near 0 dBm.

1. Initially set the delay of the pulse generator to 0 µs. Set the Peak Power Sensor to the EXT mode instead of the CW mode. Then select:

   [ENTER] [1] [VDC] [ENTER] [1] [µS] [ENTER] [0] [µS] [ENTER]

2. Set EXT Trigger. Set the top line of the display for A, and the bottom line for DLYA (see Figure 2-5). Set the delay for 1 µs. Check that the Sample Delay width is at 1 µs ±25%.

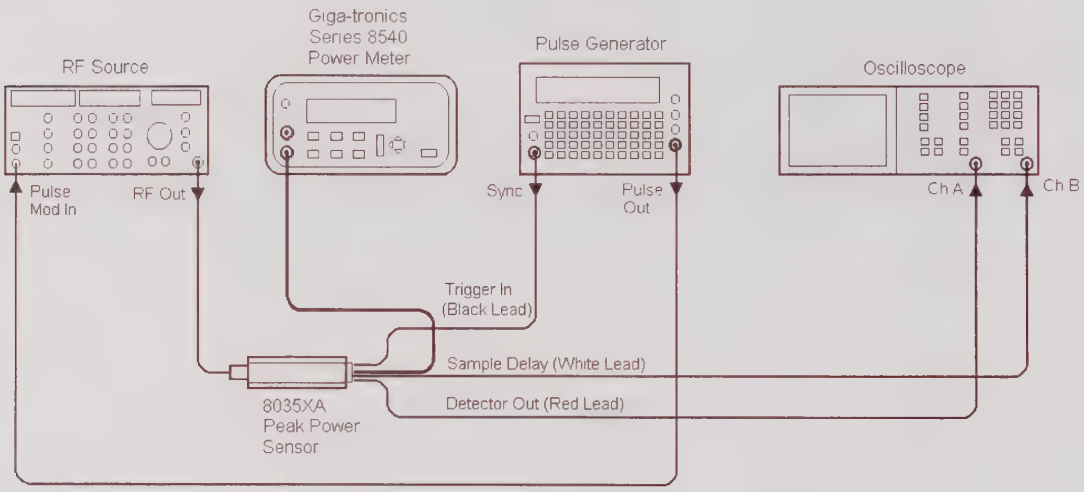


Figure 4-2. Detector Output and Trigger Level Setup

4.5 Detector Output Test

Leave the test setup as shown in Figure 4-2. Connect the 1 MΩ oscilloscope input to the Detector Output. Verify that the pulse has an amplitude of approximately 200 mV peak to peak for a 0 dBm signal.

4.6 Trigger Level Test

1. Set the INTernal trigger delay to 10 µs and trigger level to 0 dBm. Set the input pulse amplitude to 10 dBm. Verify triggering by noting that the sample delay pulse is present.
2. Set the trigger level to -5 dBm. Set the input level to 0 dBm and verify trigger operation. Set the trigger to -10 dBm and verify trigger operation. Set the input level to -20 dBm and verify triggering does not occur.
3. Select Pulse Sensor EXT TRIG. Set the external trigger to 1.7 Vdc. Verify triggering with +5 V TTL peak pulse input, and no trigger with the EXT TRIG IN.

4.7 Delay Test

The Upper and Lower Limits in Table 4-1 are the minimum tolerances to test Delay functionality.

1. Connect sensor to channel A of the 8541/2, allow to warm up for 24 hours, and then calibrate the sensor.
2. Select **PRESET** from the RECALL menu.
3. Connect the sensor to a pulse generator with a 0 dBm, 50 MHz, 2 µs pulse.
4. Use an oscilloscope or a frequency/width counter and measure the pulse width of the SAMPLE DELAY output at the settings listed in Table 4-1. The sample delay measurements in the chart are referenced at 1.7 V:

Table 4-1. Sample Delay Limits

Delay Setting	Lower Limit	Upper Limit
-20 ns	10 ns	30 ns
60 ns	40 ns	110 ns
1 µs	900 ns	1100 ns
10 µs	9 µs	11 µs
100 µs	90 µs	110 µs
1 ms	900 µs	1100 µs
100 ms	97 ms	103 ms

This completes the Specification and Performance Verification Tests for the 8035XA Peak Power Sensor. If the Sensor has performed as described in the preceding tests, it is functional and correctly calibrated.

If the sensor fails to meet the criteria defined in these tests, refer to the Maintenance and Troubleshooting chapters of this manual, or contact your local Giga-tronics Sales Representative for assistance.

Giga-tronics Series 8035XA Peak Power Sensors
Performance Verification Test
Data Recording Sheet

Date: _____ Model 8035_A: _____

Operator: _____ Peak Power Sensor S/N: _____

Test Number: _____ (if required)

CW Linearity Data							
Step Attenuator Value	Power Set Point	Power Meter Reading (P)	8541/2 Reading (R)	Power Ratio	Reading Ratio	[1]Linearity Error (%)	
						[3]Linearity Specification	[2]Accumulated Linearity Error
0 dB	10.00 mW ±0.25%	P1 =	R1 =	P1/P2 =	R1/R2 =		
	1.0 mW ±0.025%	P2 =	R2 =			±4%	Same as Lin error above
10 dB	10.00 mW ±0.25%	P1 =	R1 =	P1/P2 =	R1/R2 =		
	1.0 mW ±0.025%	P2 =	R2 =			±4%	
20 dB	10.00 mW ±0.25%	P1 =	R1 =	P1/P2 =	R1/R2 =		
	1.0 mW ±0.025%	P2 =	R2 =			±4%	
30 dB	10.00 mW ±0.25%	P1 =	R1 =	P1/P2 =	R1/R2 =		
	1.0 mW ±0.025%	P2 =	R2 =			±4%	
40 dB	10.00 mW ±0.25%	P1 =	R1 =	P1/P2 =	R1/R2 =		
	1.0 mW ±0.025%	P2 =	R2 =			±9%	

Notes:

1. Linearity Error (%) = [(R1/R2) / (P1/P2) - 1] x 100
2. Accumulated error is the sum of the current 10 dB segment linearity error plus the previous accumulated error.
3. System linearity + power meter uncertainty + zero settability

Peak Linearity Data							
Step Attenuator Value	Power Set Point	Power Meter Reading (P)	8541/2 Reading (R)	Power Ratio	Reading Ratio	[1]Linearity Error (%)	
						[3]Linearity Specification	[2]Accumulated Linearity Error
0 dB	10.00 mW ±0.25%	P1 =	R1 =	P1/P2 =	R1/R2 =		
	1.0 mW ±0.025%	P2 =	R2 =			±4%	Same as Lin error above
10 dB	10.00 mW ±0.25%	P1 =	R1 =	P1/P2 =	R1/R2 =		
	1.0 mW ±0.025%	P2 =	R2 =			±4%	
20 dB	10.00 mW ±0.25%	P1 =	R1 =	P1/P2 =	R1/R2 =		
	1.0 mW ±0.025%	P2 =	R2 =			±4.5%	
30 dB	10.00 mW ±0.25%	P1 =	R1 =	P1/P2 =	R1/R2 =		
	1.0 mW ±0.025%	P2 =	R2 =			±9%	

Notes:

1. Linearity Error (%) = [(R1/R2) / (P1/P2) - 1] x 100
2. Accumulated error is the sum of the current 10 dB segment linearity error plus the previous accumulated error.
3. System linearity + power meter uncertainty + zero settability

5 Maintenance

5.1 Introduction

There is no regularly scheduled maintenance required for the Peak Power Sensors. Utilize the normal operation calibration procedure in Chapter 2 to ensure that the sensor is operating within its specified linearity.

It is recommended that the sensor rise-time, overshoot, and zero be calibrated at 6-month intervals as follows:

5.1.1 Rise-Time Adjustments

It is important that the rise time of the RF pulse be fast (about 10 ns), and without overshoot. Care is necessary to get repeatable results.

Connect the test setup as shown in Figure 5-2 of the Performance Verification Test procedure. Set the pulse generator for a 5 kHz pulse repetition frequency. Set the RF source to make a 2 µs wide pulse. Set the 8541/2 to display power in mW. Set the source to a fixed frequency at a power level near 10 dBm. Set the RF frequency to 50 MHz.

1. Set the delay of the pulse generator to 0 ns. Set the Peak Power Sensor to the delay triggered mode by pressing

   [MENU] (step to) [PEAK SNSR SETUP] [ENTER] [A] (or B) [ENTER] [EXT] [1.7] [ENTER] (Set Delay to 1µs) [ENTER] (Set Delay Offset to 0.00) [ENTER]

   The 8541/2 will read the settled power of the pulse, approximately 10 mW.

2. Press [REL].
3. Increase the delay of the pulse generator to 900 ns. Vary the delay until the maximum power is found. Subtract 100% from this number to calculate the overshoot.
4. Increase the delay of the pulse generator until the reading drops to 90 ±1%. Note this time.
5. Increase the delay of the pulse generator until the reading drops to 10 ±1%. Note this time.
6. Subtract the time noted in Step 4 from the time noted in Step 5. The result is the 10% to 90% power rise time.
7. C3, C59, and C63 are factory select components chosen for optimum rise-time, fall-time, and overshoot. If it is necessary to change these parts, C59 and C63 should have the same value. The detector out signal on the oscilloscope will indicate the direction of change in the rise time and overshoot, but is not suitable for quantitative measurements. For best results, profile the pulse by stepping the measurements using small (about 10 ns or less) delay increments.

5.1.2 Zero Adjustment

1. This test requires that no RF is present, and that the instrument is in the CW mode. Be sure that the system is allowed to warm up at least 30 minutes. The measurement should be made quickly to prevent cooling of the circuit. Refer to Figure 5-1.
2. Remove the cover of the sensor and connect a dc millivolt meter between TP11 (Common) and TP12 (High) on the Analog Board.
3. Adjust R33 (OFFSET ADJ) for 0.00 Vdc ±100 µV.
4. Replace the cover and calibrate the sensor.

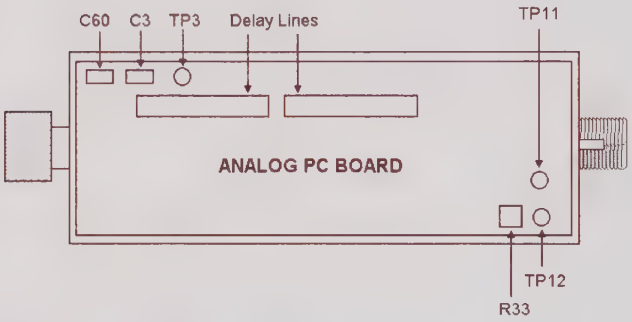


Figure 5-1. Principal Test Component Locations

5.2 Troubleshooting

Refer to the Analog and Digital PC Board schematics on pages 7-12 and 7-15, the block diagrams on pages 3-1 and 3-4, and the timing diagrams on pages 3-3, 3-6, and 3-7 for assistance in performing the following procedures.

Use a pulsed 1 GHz waveform of about 0 dBm for troubleshooting to trace the signal through the sensor. The waveform should have a rep rate of about 1 kHz, pulse width about 100 µs to start, INT trigger at -20 dBm, and delay = 0.

At times it may be required to carefully check voltages at IC pins. Since the PC boards are surface mount, careless probing can: short two pins, break leads, damage boards and, in extreme cases, cause the components to break away from the board taking pads and traces with them.

CAUTION

Static sensitive components. Use proper techniques including, but not limited to, wrist straps, anti-static mats, tools, soldering irons, desoldering tools, and proper non-static clothing.

The most common cause of failure is the application of too much power (more than +23 dBm) which destroys the diode element. This will most likely manifest itself as a non-successful completion of the sensor calibration routine. (see Chapter 2). Verifying that another sensor will calibrate successfully will isolate the fault to the peak power sensor and not the instrument.

A1TP1 should measure about -0.2V, and A1TP2 should measure about +0.2V with a 0 dB CW input. If either of these voltages are absent, the element is probably bad and should be replaced.

The following table lists problems that can occur with the sensor in the logical order that these problems might become evident. Go to the first described symptom, and then follow the instructions given in the section covering that symptom. Symptom descriptions assume that everything preceding that symptom in the table is functioning properly.

Table 5-1. Sensor Malfunction Symptoms

Symptom	Section
Sensor is not recognized as being present	5.2.1
Will not calibrate / zero	5.2.2
INTernal will not trigger or level error	5.2.3
EXTernal will not trigger or level error	5.2.4
Delay error	5.2.5

In these procedures, the component prefix A1 designates parts located on the Analog PC Board. The prefix A2 is for parts located on the Digital PC Board. Voltage levels at Monitor Out and at test points are approximate. These values vary from sensor to sensor. To ensure that proper levels are present, increase or decrease the measured input or trigger level. The measured point should change correspondingly. Certain supplies (A1U3, 4, 5, 6, and A2U18 and A2 5 V line) are isolated by 10 ohm resistors which decouple noise and can act as fuses. If one of these resistors (A1R108, 109, 110, 111, or 112, or A2R42 or A2R45 is open, replace the corresponding tantalum capacitor: A1C51, 52, 53, 54, or A1C30 or A2C19.

5.2.1 Sensor Not Present

Note that this type of failure indication is usually caused by a bad cable or a faulty temperature sensing thermistor (RT1)

1. With the sensor disconnected from the power meter, check the resistance from Digital board J1 pin 4 to ground. Is it about 10 kΩ?

   No A2RT1 bad

   (If A2RT1 must be replaced, be sure to install the new RT1 using heat sink compound. RT1 should protrude 0.13" above the PC board.)

   Yes Cable bad

5.2.2 Calibration

Calibration failures are generally caused by a damaged diode element. Ensure that the system is in the CW mode. Steps 1 and 2 refer to the Analog board.

A1TP3, TP4, TP5, and TP6 should be checked for oscillation, especially if drifting occurs.

☛ **NOTE:** Over-score indicates a logic-NOT condition.

1. Check for a signal present at MONITOR OUT or A1TP9. (Should be near 0 µV with no signal input, and about +3 Vdc at +20 dBm.)

   No Check as appropriate, A1TP4, then A1TP5, or A1TP3, A1TP1, and A1TP2. Replace as required (as isolated by test points and supply tests) A1U3, A1U4, or A1U5.

   Yes Continue to Step 2.

2. (A1TP9 OK) Check for toggling signal at J2 pins 4 and 5 (SAMP and $\overline{\text{SAMP}}$). Toggling?

   No Continue to Step 3

   Yes Check A1TP7, A1TP10, and the DC OFFSET adjustment (A1R33). A1TP10 should be 0 with no signal input, and about 0.6 with +20 dBm. See Zero Adjustment in Section 5.1.2.

3. (SAMP not toggling) Refer to the Digital board. Check TRIG (A2TP14) Is it High?

   No A2U17, A2U8, A2CR4, or A2R35 bad

   Yes Continue to Step 4

4. (TRIG high) A2TP1 toggling? (10 MHz CTR-CLK)

   No A2U13 (A2TP12), A2U9, or A2U3 bad

   Yes Continue to Step 5

5. (A2TP1 OK) A2TP9 high?

   No A2U9, A2U10, or A2U12B bad

   Yes Continue to Step 6

6. (A2TP9 high) A2TP11 stuck high?

   No A2U7 bad, or the coarse counter A2U1, U5, U6, or U16. Note that A2TP8 and TP10 check the ICs on the back of the board for RCOs (Ripple Carry Outs). Note that the RCOs of the counters will glitch (Ignore pulses less than 50 ns. Adjusting the scope trigger level generally allows glitch rejection.) A pulse of approximately one clock width is necessary for the next stage to count.

   Yes A2U10, U12, U1, or U4 Check A2TP16, A2TP5, and A2TP7

5.2.3 INTernal

Internal problems are generally due to trigger problems. A1U9 has a programming peculiarity in that it requires an 80 ns hold time. A2R12 and A2C25 satisfy that requirement. If the DAC appears not to program, check A1CR1 before checking the DATA-4 timing or replacing the IC.

1. Set the trigger level to +20 dBm. Check the voltage at A1TP8. >4 Vdc.

   No A1CR1 A1U6, A1U8, A1R12, or A1C25 bad

   Yes Continue to Step 2

2. Set the trigger level to -30 dBm. Check the voltage at A1TP8. <+0.1 Vdc.

   No A1U6, A1U8, A1R12, or A1C25 bad

   Yes Continue to Step 3

3. Check for pulses (about 4 ±2 V peak) at A1TP6 with 0 dB, 1 kHz repetition rate.

   No Continue to Step 4

   Yes Go to Step 5

4. (A1TP6 bad) J2 pin 13 low?

   No A2U17 or A2R32 bad

   Yes A1U10, A1U11, A1U6. Check for (about 400 ±200 mV) pulses at U6 pin 3 (A1U10 bad if not). Else, replace A1U11 or A1U6.

5. Check voltage at A1TP8. Should be about +40 mVdc, about +4 Vdc with trigger level at +20 dBm, and about 0 Vdc with trigger level at -30 dBm.

   No A1CR1, A1U9, A1U8

   Yes Check A2TP17 (READY - should be high) and A2TP6. If A2TP6 does not toggle, replace A2U18. Else, A2U4, A2U12, or A2U8.

5.2.4 EXTernal

Check A1R127, A1R128, EXT (J2 pin 11 - A2U17 bad if EXT is high), else replace A1U10.

5.2.5 Delay

Delay problems are caused by the coarse counter, the fine delay, or the serial data link. Problems can be grouped by checking in order the delays shown in the table below.

This is a stuck or missing bit test. The next two digit number can be used, such as 26 µs for 25.6 µs, or 3.3 ms for 3.27 ms. The accuracy, while typically within ±2% ±5 ns, only needs to be verified to ±25% to ensure that there are no stuck bits.

Monitor the width of the SAMPLE DELAY output pulse. This signal is about 40 ns wider than the delay setting. For the first line of the table below, verify that each step is about 25 ns wider than the previous step.

All of the components are listed in Table 5-2 are located on the Digital (A2) board.

Table 5-2. Digital Board Components and Signals

Signal	Comp	Signal	Comp	Signal	Comp	Signal	Comp
0 ns	U13	25 ns	U13	50 ns	U13	75 ns	U5
200 ns	U5	400 ns	U5	800 ns	U5	1.6 ns	U5
3.2 µs	U6	6.4 µs	U6	12.8 µs	U6	25.6 µs	U6
51.2 µs	U1	102.4 µs	U1	204.8 µs	U1	409.6 µs	U1
819.2 µs	U16	1.6384 ms	U16	3.2768 ms	U16	6.5536 ms	U16
13.1072 ms	U15	26.2144 ms	U15	52.4288 ms	U15	100 ms ±2%	U15

Also check the programming ICs, especially the carry pins (pin 13) of A2U17, A2U2, and A2U14.

5.2.6 Output Problems

Check A2U9 for SAMPLE DELAY, A1R28 for MONITOR OUT. Also check J1 wiring.

5.3 Sensor Element Replacement

This section describes how to disassemble the 80350A Peak Power Sensors, how to replace sensor elements, and then to reassemble the Sensors. Refer to the diagrams on pages 7-3 through 7-7, as applicable, while performing the following steps.

CAUTION

The 80350A Sensor contains Static sensitive components. Use proper techniques including wrist straps, anti-static mats, tools, soldering irons, desoldering tools, and proper non-static clothing.

5.3.1 Disassembly of the Sensor

1. Remove screws (1) and (2). Take off the sleeve holder plate and slide the sleeve off of the cap assembly.
2. Position the sensor so that the Analog PC Board (Assembly #21350) is visible, and locate the sensor element leads. They are located on the end of the PC board nearest to the sensor housing assembly. Remove the solder from the leads of the sensor element, and remove the leads from the holes in the PC board. Straighten the leads.
3. Remove the two PC boards.
4. Unscrew the sensor housing assembly from the cap assembly. Use the wrench flats on the Housing Assembly which are located closest to the cap assembly to remove the Housing Assembly. The sensor element will stay attached to the Housing Assembly.

   If the Spring Washers fall out when the sensor housing assembly is removed, they should be replaced as shown in the diagram on page 5.

5.3.2 Replacing the Sensor Element

CAUTION

Removal of the sensor element invalidates EEPROM calibration factors.

(Cal Factors can be verified with a Vector Network Analyzer using procedures similar to standard power meter sensors.)

1. Remove the old sensor element from the Sensor housing assembly by pulling the element straight out from the assembly. Ensure that the center pin was removed with the element. If not, carefully remove it with a pair of tweezers.

CAUTION

Do not twist the sensor element as it is being removed. Doing so may damage the center conductor of the sensor housing assembly.

2. Take the new sensor element out of its protective packaging, and carefully straighten the leads. Do not pull sharply on the leads or they may come off.

3. Carefully insert the new sensor element into the sensor housing assembly. Gently push on the sensor element to press the sensor element pin into the center conductor contact of the sensor housing assembly. Once the element has been inserted, gently try to pull it back out of the housing assembly. If there is resistance, the element is inserted correctly. If the element comes out easily, then it has not been correctly inserted into the center conductor. Remove the sensor element, make sure that the center conductor is centered in the housing, and then reinsert the element.

5.3.3 Reassembly of the Sensor

CAUTION

The 80350A Sensor contains static sensitive components. Use proper techniques including wrist straps, anti-static mats, tools, soldering irons, desoldering tools, and proper non-static clothing.

(Refer to the diagram on page 7-3)

1. Make sure that the sensor element leads are straight. Screw the sensor housing assembly into the cap assembly. Be very careful not to damage the leads of the Element.

2. Place the element leads onto the proper pads on the Analog PC board (see page 7-3). The lead from the Center pin goes to Pad 1, and the other lead goes to Pad 2. Solder the leads in place.

3. Replace the PC boards. Take care not to damage the sensor element wires.

4. After the element has been installed, it may be necessary to readjust the pulse response of the amplifier due to a possible difference in the video resistance of the new element's diodes in relationship to the old element's diodes. See Section 2.2 for checking and adjustment information.

5. Slide the sleeve onto the cap assembly. Replace the sleeve holder plate. Insert and tighten screws (1) and (2), and return the sensor to service.

6 Parts Lists

6.1 Introduction

This chapter contains the parts lists for major and minor assemblies in the Series 8035XA Peak Power Sensors.

80350A PEAK POWER SENSOR, TYPE N REV: C

Item	Part Number	Qty	Cage	Mfr's Part Number	Description
1	21472	REF	58900	21472	MDL 80350A SENSOR,N,18GHZ
2	21057	REF	58900	21057	SCHEMATIC,TRIGGERABLE SENSOR
3	16718	REF	58900	16718	THERMAL GREASE
4	HTO0-00809	4	58900	HTO0-00809	8 NYLON CABLE TIE
5	17274-001	3	58900	17274-001	SPRING, DISC, BELLEVILLE, MOD.
6	19557-004	1	58900	19557-004	STATIC SHIELDING BAG
7	21469	1	58900	21469	SLEEVE
8	21470	1	58900	21470	PLATE,HOUSING END
9	21484	1	58900	21484	LABEL,80350A,18GHZ
10	HIWP-00250	4	06383	T25N-M	.25 OD SPIRAL WRAP
11	21550	1	06915	HRT-1	SPIRAL WRAPPING TOOL
12	21568	1	58900	21568	MANUAL,80350A
13	21569	1	58900	21569	PSD,MDL 80350A,SENSOR
14	21575	1	58900	21575	SCD,MDL 80350A,SENSOR
15	60338	REF	58900	60338	8035x SERIES TEST PROC
102	HBFP-25604	2	26233	NS139CR256R4	2-56 X 1/4 FLAT
103	HBPP-25608	2	26233	NS137CR256R8	2-56 X 1/2 PAN
A1	21350	1	58900	21350	PCB ASSY,ANALOG
A2	21353	1	58900	21353	PCB ASSY,DIGITAL
A3	15183	1	58900	15183	TYPE N 18.5GHZ DET.HSG.ASSY
A4	21471	1	58900	21471	SENSOR HOUSING ASSY
A5	21563	1	58900	21563	DET ELEMENT,UNTESTED,80350A
W1	21460-001	1	74970	21460-XXX	6 FT WHITE SMB-BNC CABLE
W2	21460-002	1	74970	21460-002	6 FT RED SMB-BNC CABLE
W3	21460-003	1	74970	21460-XXX	6 FT BLACK SMB-BNC CABLE

80351A HI PWR PEAK POWER SENSOR, 5W REV: B

Item	Part Number	Qty	Cage	Mfr's Part Number	Description
1	21473	REF	58900	21473	MDL 80351A SENSOR,N,18GHZ,5W
2	21057	REF	58900	21057	SCHEMATIC,TRIGGERABLE SENSOR
3	16718	REF	58900	16718	THERMAL GREASE
4	HTO0-00809	4	58900	HTO0-00809	8 NYLON CABLE TIE
5	17274-001	3	58900	17274-001	SPRING, DISC, BELLEVILLE, MOD.
6	19557-004	1	58900	19557-004	STATIC SHIELDING BAG
7	21426	1	1AU47	2-20	ATTEN,5W,20DB
8	21469	1	58900	21469	SLEEVE
9	21470	1	58900	21470	PLATE,HOUSING END
10	21485	1	58900	21485	LABEL,80351A,18GHZ,5W
11	HIWP-00250	4	06383	T25N-M	.25 OD SPIRAL WRAP
12	21550	1	06915	HRT-1	SPIRAL WRAPPING TOOL
13	21568	1	58900	21568	MANUAL,80350A
14	21570	1	58900	21570	PSD,MDL 80351A,SENSOR
15	21576	1	58900	21576	SCD,MDL 80351A,SENSOR
16	60338	REF	58900	60338	8035x SERIES TEST PROC
101	HWSS-20200	2	58900	HWSS-20200	#2 X 1/8 SPLIT LOCK
102	HBFP-25604	2	26233	NS139CR256R4	2-56 X 1/4 FLAT
103	HBPP-25608	2	26233	NS137CR256R8	2-56 X 1/2 PAN
A1	21350	1	58900	21350	PCB ASSY,ANALOG
A2	21353	1	58900	21353	PCB ASSY,DIGITAL
A3	15183	1	58900	15183	TYPE N 18.5GHZ DET.HSG.ASSY
A4	21471	1	58900	21471	SENSOR HOUSING ASSY
A5	21563	1	58900	21563	DET ELEMENT,UNTESTED,80350A
W1	21460-001	1	74970	21460-XXX	6 FT WHITE SMB-BNC CABLE
W2	21460-002	1	74970	21460-002	6 FT RED SMB-BNC CABLE
W3	21460-003	1	74970	21460-XXX	6 FT BLACK SMB-BNC CABLE

80352A HI PWR PEAK POWER SENSOR, 25W REV: B

Item	Part Number	Qty	Cage	Mfr's Part Number	Description
1	21474	REF	58900	21474	MDL 80352A SENSOR,N,18GHZ,25W
2	21057	REF	58900	21057	SCHEMATIC,TRIGGERABLE SENSOR
3	16718	REF	58900	16718	THERMAL GREASE
4	HTO0-00809	4	58900	HTO0-00809	8 NYLON CABLE TIE
5	17274-001	3	58900	17274-001	SPRING, DISC, BELLEVILLE, MOD.
6	19557-003	1	58900	19557-003	STATIC SHIELDING BAG
7	21425	1	64671	18N25W-30DB	ATTEN,25W,30DB
8	21469	1	58900	21469	SLEEVE
9	21470	1	58900	21470	PLATE,HOUSING END
10	21486	1	58900	21486	LABEL,80352A,18GHZ,25W
11	HIWP-00250	4	06383	T25N-M	.25 OD SPIRAL WRAP
12	21550	1	06915	HRT-1	SPIRAL WRAPPING TOOL
13	21568	1	58900	21568	MANUAL,80350A
14	21571	REF	58900	21571	PSD,MDL 80352A,SENSOR
15	21577	REF	58900	21577	SCD,MDL 80352A,SENSOR
16	60338	REF	58900	60338	8035x SERIES TEST PROC
101	HWSS-20200	2	58900	HWSS-20200	#2 X 1/8 SPLIT LOCK
102	HBFP-25604	2	26233	NS139CR256R4	2-56 X 1/4 FLAT
103	HBPP-25608	2	26233	NS137CR256R8	2-56 X 1/2 PAN
A1	21350	1	58900	21350	PCB ASSY,ANALOG
A2	21353	1	58900	21353	PCB ASSY,DIGITAL
A3	15183	1	58900	15183	TYPE N 18.5GHZ DET.HSG.ASSY
A4	21471	1	58900	21471	SENSOR HOUSING ASSY
A5	21563	1	58900	21563	DET ELEMENT,UNTESTED,80350A
W1	21460-001	1	74970	21460-XXX	6 FT WHITE SMB-BNC CABLE
W2	21460-002	1	74970	21460-002	6 FT RED SMB-BNC CABLE
W3	21460-003	1	74970	21460-XXX	6 FT BLACK SMB-BNC CABLE

80353A PEAK POWER SENSOR, TYPE K REV: C

Item	Part Number	Qty	Cage	Mfr's Part Number	Description
1	21475	REF	58900	21475	MDL 80353A SENSOR,K,26.5GHZ
2	21057	REF	58900	21057	SCHEMATIC,TRIGGERABLE SENSOR
3	16718	REF	58900	16718	THERMAL GREASE
4	HTO0-00809	4	58900	HTO0-00809	8 NYLON CABLE TIE
5	17274-001	3	58900	17274-001	SPRING, DISC, BELLEVILLE, MOD.
6	19557-004	1	58900	19557-004	STATIC SHIELDING BAG
7	21469	1	58900	21469	SLEEVE
8	21470	1	58900	21470	PLATE,HOUSING END
9	21487	1	58900	21487	LABEL,80353A,26.5GHZ
10	HIWP-00250	4	06383	T25N-M	.25 OD SPIRAL WRAP
11	21550	1	06915	HRT-1	SPIRAL WRAPPING TOOL
12	21568	1	58900	21568	MANUAL,80350A
13	21572	1	58900	21572	PSD,MDL 80353A,SENSOR
14	21578	1	58900	21578	SCD,MDL 80353A,SENSOR
15	60338	REF	58900	60338	8035x SERIES TEST PROC
101	HWSS-20200	2	58900	HWSS-20200	#2 X 1/8 SPLIT LOCK
102	HBFP-25604	2	26233	NS139CR256R4	2-56 X 1/4 FLAT
103	HBPP-25608	2	26233	NS137CR256R8	2-56 X 1/2 PAN
A1	21350	1	58900	21350	PCB ASSY,ANALOG
A2	21353	1	58900	21353	PCB ASSY,DIGITAL
A3	20706-001	1	58900	20706-001	8500/SAM DET HSG ASSY,TYPE K
A4	21471	1	58900	21471	SENSOR HOUSING ASSY
A5	21563	1	58900	21563	DET ELEMENT,UNTESTED,80350A
W1	21460-001	1	74970	21460-XXX	6 FT WHITE SMB-BNC CABLE
W2	21460-002	1	74970	21460-002	6 FT RED SMB-BNC CABLE
W3	21460-003	1	74970	21460-XXX	6 FT BLACK SMB-BNC CABLE

80354A PEAK POWER SENSOR, TYPE K REV: C

Item	Part Number	Qty	Cage	Mfr's Part Number	Description
1	21476	REF	58900	21476	MDL 80354A SENSOR,K,40GHZ
2	21057	REF	58900	21057	SCHEMATIC,TRIGGERABLE SENSOR
3	16718	REF	58900	16718	THERMAL GREASE
4	HTO0-00809	4	58900	HTO0-00809	8 NYLON CABLE TIE
5	17274-001	3	58900	17274-001	SPRING, DISC, BELLEVILLE, MOD.
6	19557-004	1	58900	19557-004	STATIC SHIELDING BAG
7	21469	1	58900	21469	SLEEVE
8	21470	1	58900	21470	PLATE,HOUSING END
9	21488	1	58900	21488	LABEL,80354A,40GHZ
10	HIWP-00250	4	06383	T25N-M	.25 OD SPIRAL WRAP
11	21550	1	06915	HRT-1	SPIRAL WRAPPING TOOL
12	21568	1	58900	21568	MANUAL,80350A
13	21573	REF	58900	21573	PSD,MDL 80354A,SENSOR
14	21579	REF	58900	21579	SCD,MDL 80354A
15	60338	REF	58900	60338	8035x SERIES TEST PROC
101	HWSS-20200	2	58900	HWSS-20200	#2 X 1/8 SPLIT LOCK
102	HBFP-25604	2	26233	NS139CR256R4	2-56 X 1/4 FLAT
103	HBPP-25608	2	26233	NS137CR256R8	2-56 X 1/2 PAN
A1	21350	1	58900	21350	PCB ASSY,ANALOG
A2	21353	1	58900	21353	PCB ASSY,DIGITAL
A3	20706-001	1	58900	20706-001	8500/SAM DET HSG ASSY,TYPE K
A4	21471	1	58900	21471	SENSOR HOUSING ASSY
A5	21563	1	58900	21563	DET ELEMENT,UNTESTED,80350A
W1	21460-001	1	74970	21460-XXX	6 FT WHITE SMB-BNC CABLE
W2	21460-002	1	74970	21460-002	6 FT RED SMB-BNC CABLE
W3	21460-003	1	74970	21460-XXX	6 FT BLACK SMB-BNC CABLE

80355A HI PWR PEAK POWER SENSOR, 50W REV: B

Item	Part Number	Qty	Cage	Mfr's Part Number	Description
1	21477	REF	58900	21477	MDL 80355A SENSOR,N,18GHZ,50W
2	21057	REF	58900	21057	SCHEMATIC,TRIGGERABLE SENSOR
3	16718	REF	58900	16718	THERMAL GREASE
4	HTO0-00809	4	58900	HTO0-00809	8 NYLON CABLE TIE
5	17274-001	3	58900	17274-001	SPRING, DISC, BELLEVILLE, MOD.
6	19557-003	1	58900	19557-003	STATIC SHIELDING BAG
7	21424	1	64671	18N50W-30DB	ATTEN,50W,30DB
8	21469	1	58900	21469	SLEEVE
9	21470	1	58900	21470	PLATE,HOUSING END
10	21489	1	58900	21489	LABEL,80355A,18GHZ,50W
11	HIWP-00250	4	06383	T25N-M	.25 OD SPIRAL WRAP
12	21550	1	06915	HRT-1	SPIRAL WRAPPING TOOL
13	21568	1	58900	21568	MANUAL,80350A
14	21574	1	58900	21574	PSD,MDL 80355A,SENSOR
15	21580	1	58900	21580	SCD,MDL 80355A,SENSOR
16	60338	1	58900	60338	8035x SERIES TEST PROC
101	HWSS-20200	2	58900	HWSS-20200	#2 X 1/8 SPLIT LOCK
102	HBFP-25604	2	26233	NS139CR256R4	2-56 X 1/4 FLAT
103	HBPP-25608	2	26233	NS137CR256R8	2-56 X 1/2 PAN
A1	21350	1	58900	21350	PCB ASSY,ANALOG
A2	21353	1	58900	21353	PCB ASSY,DIGITAL
A3	15183	1	58900	15183	TYPE N 18.5GHZ DET.HSG.ASSY
A4	21471	1	58900	21471	SENSOR HOUSING ASSY
A5	21563	1	58900	21563	DET ELEMENT,UNTESTED,80350A
W1	21460-001	1	74970	21460-XXX	6 FT WHITE SMB-BNC CABLE
W2	21460-002	1	74970	21460-002	6 FT RED SMB-BNC CABLE
W3	21460-003	1	74970	21460-XXX	6 FT BLACK SMB-BNC CABLE

21471 SENSOR HOUSING ASSY REV: B

Item	Part Number	Qty	Cage	Mfr's Part Number	Description
1	17697-001	0	04569	N304-736U-91	28 GA PVC COLOR 91
2	17697-002	0	04569	N304-736U-92	28 GA PVC COLOR 92
3	17697-003	0	04569	N304-736U-93	28 GA PVC COLOR 93
4	17697-004	0	04569	N304-736U-94	28 GA PVC COLOR 94
5	17697-008	0	04569	N304-736U-8	28 GA PVC COLOR 8
6	17697-009	0	16428	UL1429	28 GA PVC COLOR 9
7	17697-011	0	29005	1061-28-7/36-1	28 GA PVC COLOR 1
8	17697-012	0	04569	N304-736U-2	28 GA PVC COLOR 2
9	17697-013	0	04569	N304-736-3	28 GA PVC COLOR 3
10	17697-014	0	04569	N304-736U-4	28 GA PVC COLOR 4
11	17697-015	0	04569	N304-736U-5	28 GA PVC COLOR 5
12	17697-016	0	29005	1061-28-7/36-6	28 GA PVC COLOR 6
13	17697-017	0	29005	1061-28-7/36-7	28 GA PVC COLOR 7
17	21467	1	58900	21467	HOUSING
18	16939-001	REF	58900	16939-001	THREAD LOCKING ADHESIVE-MLID
J1	20248	1	26840	20248	MOD., CONN RCPT AUDIO 14 CONT
J2	JRBM-00000	1	8K805	09-1080-01C	SMB M BULK MOUNT
J3	JRBM-00000	1	8K805	09-1080-01C	SMB M BULK MOUNT
J4	JRBM-00000	1	8K805	09-1080-01C	SMB M BULK MOUNT
P1	21054-002	1	58900	21054-002	7 PIN STRIPLINE SOCKET
P2	21054-001	1	20999	06DR-E8M	6 PIN STRIPLINE SOCKET

21350 PCB ASSY, ANALOG (A1), REV: P

Item	Part Number	Qty	Cage	Mfr's Part Number	Description
1	21349	1	58900	21349	PCB,ANALOG
2	60340	REF	58900	60340	80350 ANALOG PCA TEST PROC
C1	16258-007	1	68919	MKS2-0.01UF-5%-63	.01UF 63V POLYESTER
C2	16258-006	1	68919	MKS2-0.1UF-10%-63	.1UF 63V POLYESTER
C3	CK50-00047	1	72982	GRH708C0G4R7D200AL	4.7PF COG CHIP CERAMIC
C5	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C6	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C7	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C8	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C9	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C10	CK50-00047	1	72982	GRH708C0G4R7D200AL	4.7PF COG CHIP CERAMIC
C11	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C12	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C13	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C14	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C15	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C16	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C21	20962-011	1	04222	08055A102JTN	1000 PF NPO CHIP CERAMIC
C22	CK50-00047	1	72982	GRH708C0G4R7D200AL	4.7PF COG CHIP CERAMIC
C23	CK50-00047	1	72982	GRH708C0G4R7D200AL	4.7PF COG CHIP CERAMIC
C24	CK50-00047	1	72982	GRH708C0G4R7D200AL	4.7PF COG CHIP CERAMIC
C31	20961-007	1	04222	12105C104KTN	.1 UF X7R CHIP CERAMIC
C51	21627-001	1	31433	CWR11KH106MM	10 UF 25V TANTALUM SMT
C52	21627-001	1	31433	CWR11KH106MM	10 UF 25V TANTALUM SMT
C53	21627-001	1	31433	CWR11KH106MM	10 UF 25V TANTALUM SMT
C54	21627-001	1	31433	CWR11KH106MM	10 UF 25V TANTALUM SMT
C58	CK50-00470	1	04222	08051A470JATMA	47PF COG CHIP CERAMIC
C59	CK50-00470	1	04222	08051A470JATMA	47PF COG CHIP CERAMIC
C63	CK50-00470	1	04222	08051A470JATMA	47PF COG CHIP CERAMIC
C66	CK50-00047	1	72982	GRH708C0G4R7D200AL	4.7PF COG CHIP CERAMIC
C67	CK50-00047	1	72982	GRH708C0G4R7D200AL	4.7PF COG CHIP CERAMIC
C68	CK50-00047	1	72982	GRH708C0G4R7D200AL	4.7PF COG CHIP CERAMIC
C70	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C71	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C72	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C73	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C74	16258-006	1	68919	MKS2-0.1UF-10%-63	.1UF 63V POLYESTER
C75	CK50-01100	1	95275	VJ0805A101JXBMT	100 PF CERAMIC NPO
C76	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C80	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C81	CK50-00100	1	95275	VJ0805A100JXAMB	10 PF NPO CHIP
CR1	21443	1	27014	MMBZ5231B	MMBZ5231B 5.1V ZENER SMT
CR2	20968	1	18041	BAS16	MMBD914L SW. DIODE SMT
CR3	20968	1	18041	BAS16	MMBD914L SW. DIODE SMT
CR8	21444	1	04713	CMPZ5240B	MMBZ5240B 10V ZENER SMT
CR9	21444	1	04713	CMPZ5240B	MMBZ5240B 10V ZENER SMT
J1	21055-002	1	58900	21055-002	7 PIN STRIPLINE PLUG
J2	21458-001	1	55322	BBL-113-T-E	13 PIN PLUG STRIP
R1	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R2	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R3	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R7	21445-006	1	65970	RK73H2AT2211F	2.21K OHM 1% FILM SMT
R8	RK45-41000	1	59124	RN73K2A1004F	1M OHM 1% FILM SMT
R9	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R10	21445-003	1	65970	MCR10FW1000E	100 OHM 1% FILM SMT
R11	21445-011	1	65970	MCR10EZHFX1002	10.0K OHM 1% FILM SMT
R12	21445-011	1	65970	MCR10EZHFX1002	10.0K OHM 1% FILM SMT
R14	21445-004	1	65970	MCR10FW3001E	3.01K OHM 1% FILM SMT
R18	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R19	RK45-41000	1	59124	RN73K2A1004F	1M OHM 1% FILM SMT
R21	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R27	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R28	21445-014	1	65970	MCR10FW49R9E	49.9 OHM 1% FILM SMT
R32	RK45-00000	1	59124	RM73Z2ATE	0 OHM JUMPER SMT
R33	21024-001	1	73188	84PR100K	100K OHM POT 15T SURF MT
R37	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R38	21445-003	1	65970	MCR10FW1000E	100 OHM 1% FILM SMT

21350 PCB ASSY, ANALOG (A1), REV: P

Item	Part Number	Qty	Cage	Mfr's Part Number	Description
R39	21445-003	1	65970	MCR10FW1000E	100 OHM 1% FILM SMT
R40	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R42	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R46	21445-009	1	65970	RK73H2AT4990F	499 OHM 1% FILM SMT
R47	21445-009	1	65970	RK73H2AT4990F	499 OHM 1% FILM SMT
R53	RK45-00000	1	59124	RM73Z2ATE	0 OHM JUMPER SMT
R54	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R55	21445-007	1	65970	RK73H2AT4530F	453 OHM 1% FILM SMT
R56	21445-007	1	65970	RK73H2AT4530F	453 OHM 1% FILM SMT
R59	21445-003	1	65970	MCR10FW1000E	100 OHM 1% FILM SMT
R64	21445-003	1	65970	MCR10FW1000E	100 OHM 1% FILM SMT
R77	21445-002	1	65970	MCR10FW1003E	100K OHM 1% FILM SMT
R78	21445-002	1	65970	MCR10FW1003E	100K OHM 1% FILM SMT
R79	21445-002	1	65970	MCR10FW1003E	100K OHM 1% FILM SMT
R80	21445-002	1	65970	MCR10FW1003E	100K OHM 1% FILM SMT
R81	21445-011	1	65970	MCR10EZHFX1002	10.0K OHM 1% FILM SMT
R100	21445-013	1	65970	MCR10FW2001E	2.00K OHM 1% FILM SMT
R101	21445-002	1	65970	MCR10FW1003E	100K OHM 1% FILM SMT
R103	21445-011	1	65970	MCR10EZHFX1002	10.0K OHM 1% FILM SMT
R104	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R105	21445-015	1	65970	RK73H2AT2430F	243 OHM 1% FILM SMT
R106	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R107	21445-003	1	65970	MCR10FW1000E	100 OHM 1% FILM SMT
R108	21445-014	1	65970	MCR10FW49R9E	49.9 OHM 1% FILM SMT
R109	21445-014	1	65970	MCR10FW49R9E	49.9 OHM 1% FILM SMT
R110	21445-014	1	65970	MCR10FW49R9E	49.9 OHM 1% FILM SMT
R111	21445-014	1	65970	MCR10FW49R9E	49.9 OHM 1% FILM SMT
R118	21445-009	1	65970	RK73H2AT4990F	499 OHM 1% FILM SMT
R119	21445-013	1	65970	MCR10FW2001E	2.00K OHM 1% FILM SMT
R120	21445-017	1	65970	MCR10FW2002E	20.0K OHM 1% FILM SMT
R121	21445-002	1	65970	MCR10FW1003E	100K OHM 1% FILM SMT
R125	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R126	21445-011	1	65970	MCR10EZHFX1002	10.0K OHM 1% FILM SMT
R127	21445-002	1	65970	MCR10FW1003E	100K OHM 1% FILM SMT
R128	21445-011	1	65970	MCR10EZHFX1002	10.0K OHM 1% FILM SMT
R134	21445-016	1	65970	RK73H2AT4991F	4.99K OHM 1% FILM SMT
TP3	21456-001	1	58900	21456-001	BLACK TEST POINT
TP11	21456-001	1	58900	21456-001	BLACK TEST POINT
TP12	21456-001	1	58900	21456-001	BLACK TEST POINT
U1	21455	1	58900	21455	50 NS FIXED DELAY LINE
U2	21455	1	58900	21455	50 NS FIXED DELAY LINE
U3	21447	1	24335	AD829JR	AD829JR VIDEO OP AMP
U4	21447	1	24335	AD829JR	AD829JR VIDEO OP AMP
U5	21447	1	24335	AD829JR	AD829JR VIDEO OP AMP
U6	21447	1	24335	AD829JR	AD829JR VIDEO OP AMP
U7	21446	1	24335	AD648KR	AD648JR BIFET OP AMP
U8	21446	1	24335	AD648KR	AD648JR BIFET OP AMP
U9	21449	1	24335	DAC8043FS	DAC8043FS 12 BIT D/A
U10	21448	1	17856	DG611DY	DG611DY QUAD SPST SWITCH
U11	21448	1	17856	DG611DY	DG611DY QUAD SPST SWITCH

21353 PCB ASSY, DIGITAL (A2), REV: R

Item	Part Number	Qty	Cage	Mfr's Part Number	Description
1	21352	1	58900	21352	PCB,DIGITAL
2	21354	REF	58900	21354	SCHEMATIC,DIGITAL
3	60339	REF	58900	60339	80350 DIGITAL PCA TEST PROC
4	60339	REF	58900	60339	80350 DIGITAL PCA TEST PROC
C1	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C2	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C3	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C4	CK50-01100	1	95275	VJ0805A101JXBMT	100 PF CERAMIC NPO
C5	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C6	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C7	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C8	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C9	CK50-01100	1	95275	VJ0805A101JXBMT	100 PF CERAMIC NPO
C10	CK50-01100	1	95275	VJ0805A101JXBMT	100 PF CERAMIC NPO
C12	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C13	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C14	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C15	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C16	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C17	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C18	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C25	CK50-00470	1	04222	08051A470JATMA	47PF COG CHIP CERAMIC
C26	CK50-03100	1	31433	C0805C103KRACTR	.01 UF X7R CHIP
C27	CK50-01100	1	95275	VJ0805A101JXBMT	100 PF CERAMIC NPO
C30	21628-001	1	31433	CWR11HH106MM	10 UF 15V TANTALUM SMT
C31	21628-001	1	31433	CWR11HH106MM	10 UF 15V TANTALUM SMT
C32	CK50-00100	1	95275	VJ0805A100JXAMB	10 PF NPO CHIP
CR2	20968	1	18041	BAS16	MMBD914L SW. DIODE SMT
CR3	20968	1	18041	BAS16	MMBD914L SW. DIODE SMT
CR4	20968	1	18041	BAS16	MMBD914L SW. DIODE SMT
CR5	20517	1	18041	SD103A	MBR040 .5A 40V RECTIFIER
CR6	21443	1	27014	MMBZ5231B	MMBZ5231B 5.1V ZENER SMT
CR7	20968	1	18041	BAS16	MMBD914L SW. DIODE SMT
J1	21056-001	1	58900	21056-001	6 PIN STRIPLINE PLUG
P1	21457-001	1	63058	SBU-1X13-STGT-118	13 PIN SOCKET STRIP
R1	21445-011	1	65970	MCR10EZHFX1002	10.0K OHM 1% FILM SMT
R2	21445-011	1	65970	MCR10EZHFX1002	10.0K OHM 1% FILM SMT
R3	21445-011	1	65970	MCR10EZHFX1002	10.0K OHM 1% FILM SMT
R5	21445-002	1	65970	MCR10FW1003E	100K OHM 1% FILM SMT
R8	RK45-41000	1	59124	RN73K2A1004F	1M OHM 1% FILM SMT
R9	21445-002	1	65970	MCR10FW1003E	100K OHM 1% FILM SMT
R10	21445-005	1	65970	MCR10FW2003E	200K OHM 1% FILM SMT
R12	21445-011	1	65970	MCR10EZHFX1002	10.0K OHM 1% FILM SMT
R15	21445-003	1	65970	MCR10FW1000E	100 OHM 1% FILM SMT
R16	21445-003	1	65970	MCR10FW1000E	100 OHM 1% FILM SMT
R17	21445-014	1	65970	MCR10FW49R9E	49.9 OHM 1% FILM SMT
R30	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R32	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R33	21445-002	1	65970	MCR10FW1003E	100K OHM 1% FILM SMT
R34	21445-016	1	65970	RK73H2AT4991F	4.99K OHM 1% FILM SMT
R35	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R37	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R40	21445-010	1	65970	MCR10FW10R0E	10.0 OHM 1% FILM SMT
R41	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R42	RK45-41000	1	59124	RN73K2A1004F	1M OHM 1% FILM SMT
R43	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R44	21445-001	1	65970	MCR10EZFHFX1001	1.00K OHM 1% FILM SMT
R46	21445-011	1	65970	MCR10EZHFX1002	10.0K OHM 1% FILM SMT
RT1	15208-001	1	56866	QTMC-14	10 K OHM THERMISTOR
U1	21551-001	1	2M881	CD74ACT163M	74ACT163D BIN COUNTER SMT
U2	20859-004	1	2M881	74HC164M	MC74HC164D SHIFT REGISTER
U3	21526	1	58900	21526	DELAY LINE ASSY
U4	UTD0-00102	1	58900	UTD0-00102	74HC10D 3 INPUT NAND SMT
U5	21551-001	1	2M881	CD74ACT163M	74ACT163D BIN COUNTER SMT
U6	21551-001	1	2M881	CD74ACT163M	74ACT163D BIN COUNTER SMT
U7	21478-001	1	2M881	CD74AC74M	MC74AC74D DUAL D FF SMT
U8	21478-001	1	2M881	CD74AC74M	MC74AC74D DUAL D FF SMT

21353 PCB ASSY, DIGITAL (A2), REV: R

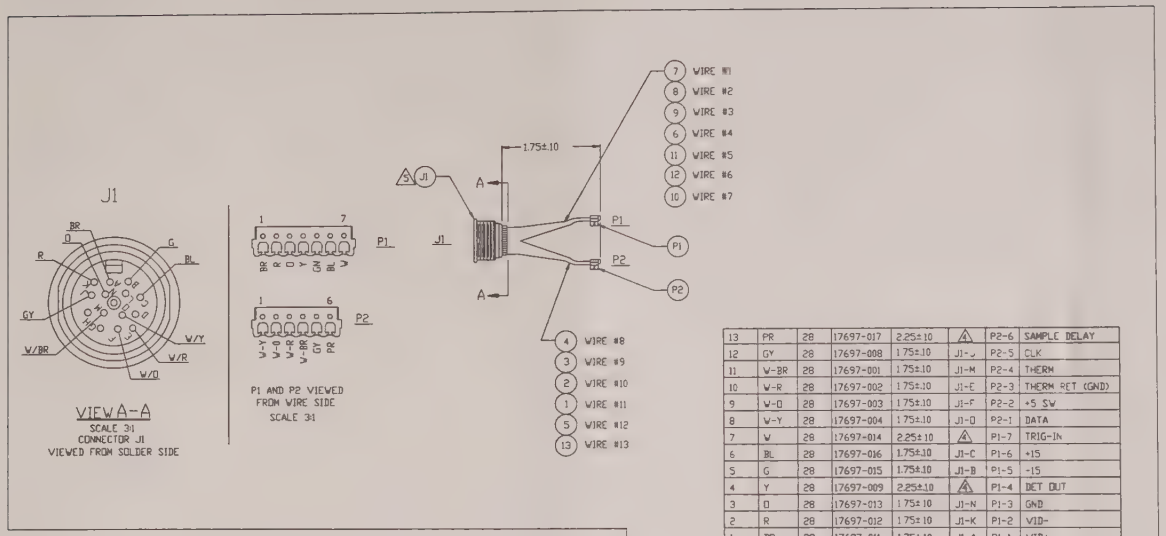
Item	Part Number	Qty	Cage	Mfr's Part Number	Description
U9	21452-001	1	04713	MC74F02D	74F02D QUAD 2IN NOR
U10	20859-005	1	66958	M74HC4538M1	MM74HC4538M DUAL MULTI
U11	20983	1	60395	X24C04S14I (INDUSTRIAL)	X24C04S14 512 x 8 EEPROM
U12	20859-005	1	66958	M74HC4538M1	MM74HC4538M DUAL MULTI
U13	21453	1	58900	21453	DS1020S-25 PROG DELAY
U14	20859-004	1	2M881	74HC164M	MC74HC164D SHIFT REGISTER
U15	21551-001	1	2M881	CD74ACT163M	74ACT163D BIN COUNTER SMT
U16	21551-001	1	2M881	CD74ACT163M	74ACT163D BIN COUNTER SMT
U17	20859-004	1	2M881	74HC164M	MC74HC164D SHIFT REGISTER
U18	17415	1	64155	LT1016CS8	LT1016CS8 COMPARATOR

7 Diagrams

7.1 Introduction

This chapter contains assembly drawings and circuit schematics for the Series 80350A Triggerable Power Sensors.

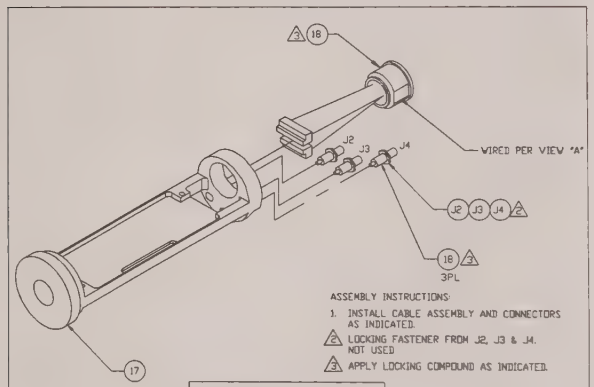
Parts lists for all assemblies are contained in Chapter 6.



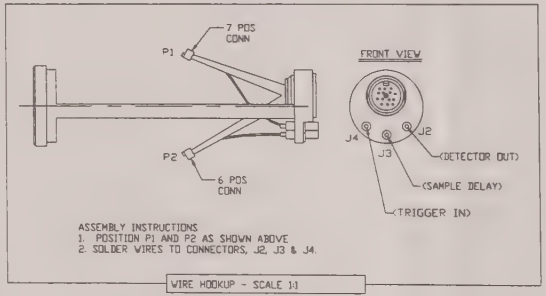
13	PR	28	17697-017	2.25±.10	4	P2-6	SAMPLE DELAY
12	GY	28	17697-008	1.75±.10	J1-J	P2-5	CLK
11	W-BR	28	17697-001	1.75±.10	J1-M	P2-4	THERM
10	W-R	28	17697-002	1.75±.10	J1-E	P2-3	THERM RET (GND)
9	W-O	28	17697-003	1.75±.10	J1-F	P2-2	+5 SW
8	W-Y	28	17697-004	1.75±.10	J1-D	P2-1	DATA
7	W	28	17697-014	2.25±.10	4	P1-7	TRIG-IN
6	BL	28	17697-016	1.75±.10	J1-C	P1-6	+15
5	G	28	17697-015	1.75±.10	J1-B	P1-5	-15
4	Y	28	17697-009	2.25±.10	4	P1-4	DET OUT
3	O	28	17697-013	1.75±.10	J1-N	P1-3	GND
2	R	28	17697-012	1.75±.10	J1-K	P1-2	VID-
1	BR	28	17697-011	1.75±.10	J1-A	P1-1	VID+
WIRE#	COLOR	GAGE	PART NO.	LENGTH	FROM	TO	REMARK

WIRE LIST

CABLE ASSEMBLY, SENSOR CABLE TO PCB - SCALE 1:1

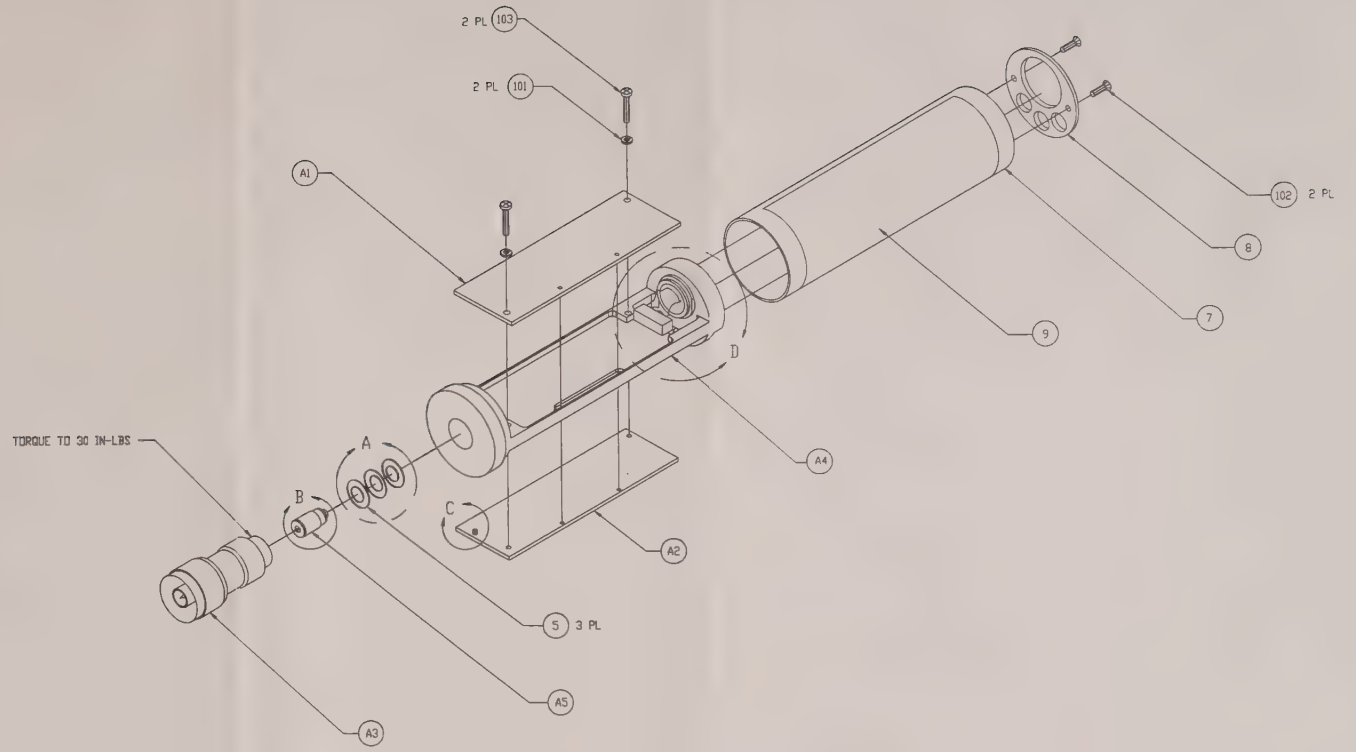


CONNECTOR INSTALLATION - SCALE 1:1

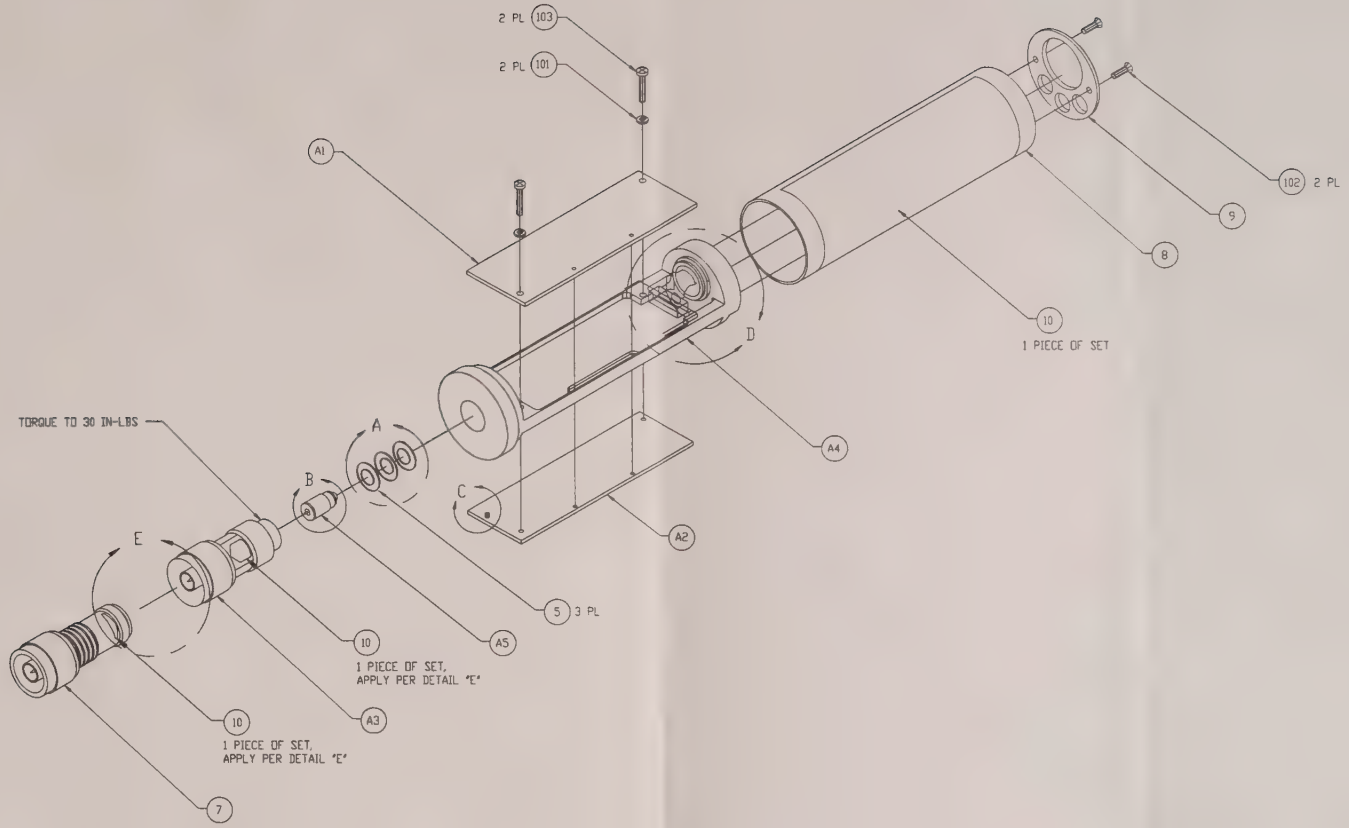


WIRE HOOKUP - SCALE 1:1

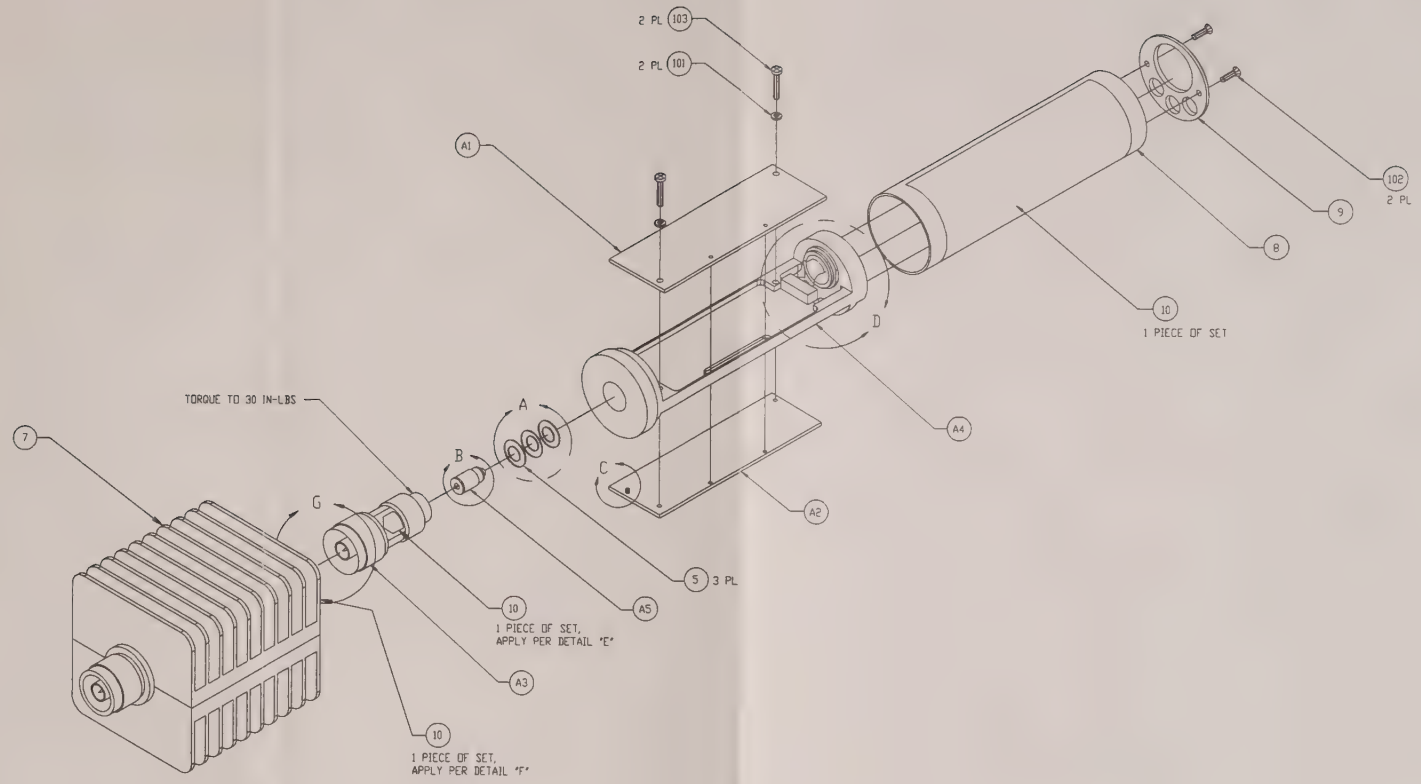
Sensor Housing Assembly
DWG# 21471 Rev B
Sheet 1 of 1



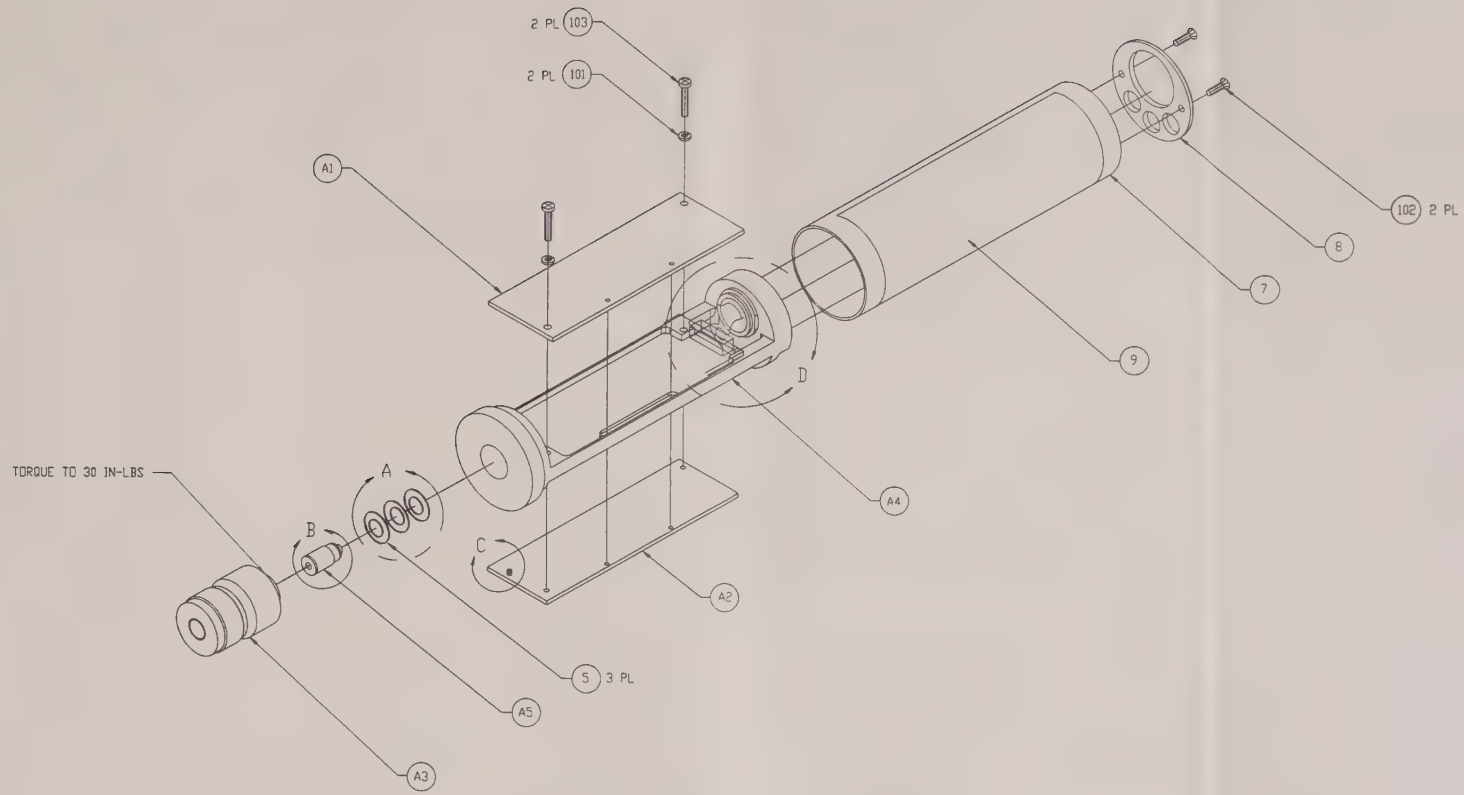
MODEL 80350A, SENSOR,
TYPE-N, 18GHz



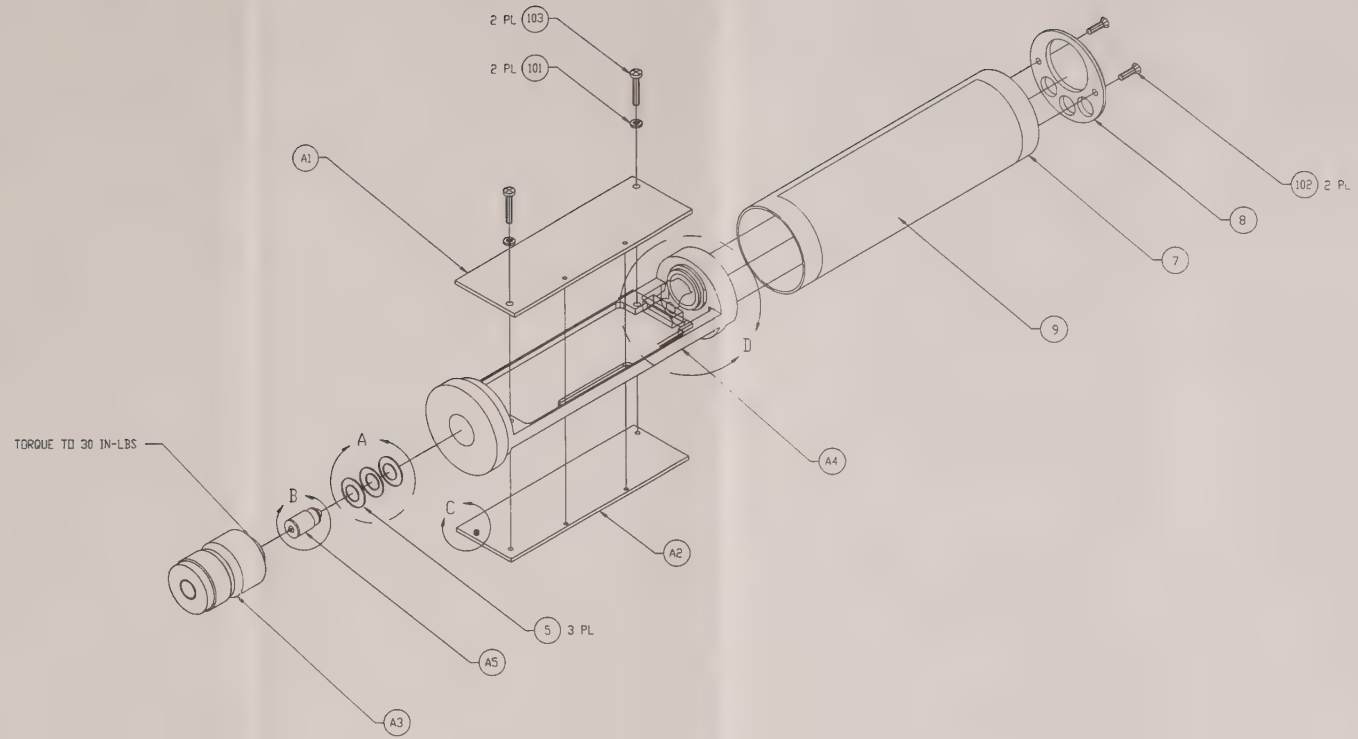
MODEL 80351A, SENSOR,
TYPE-N, 18GHz, 5W



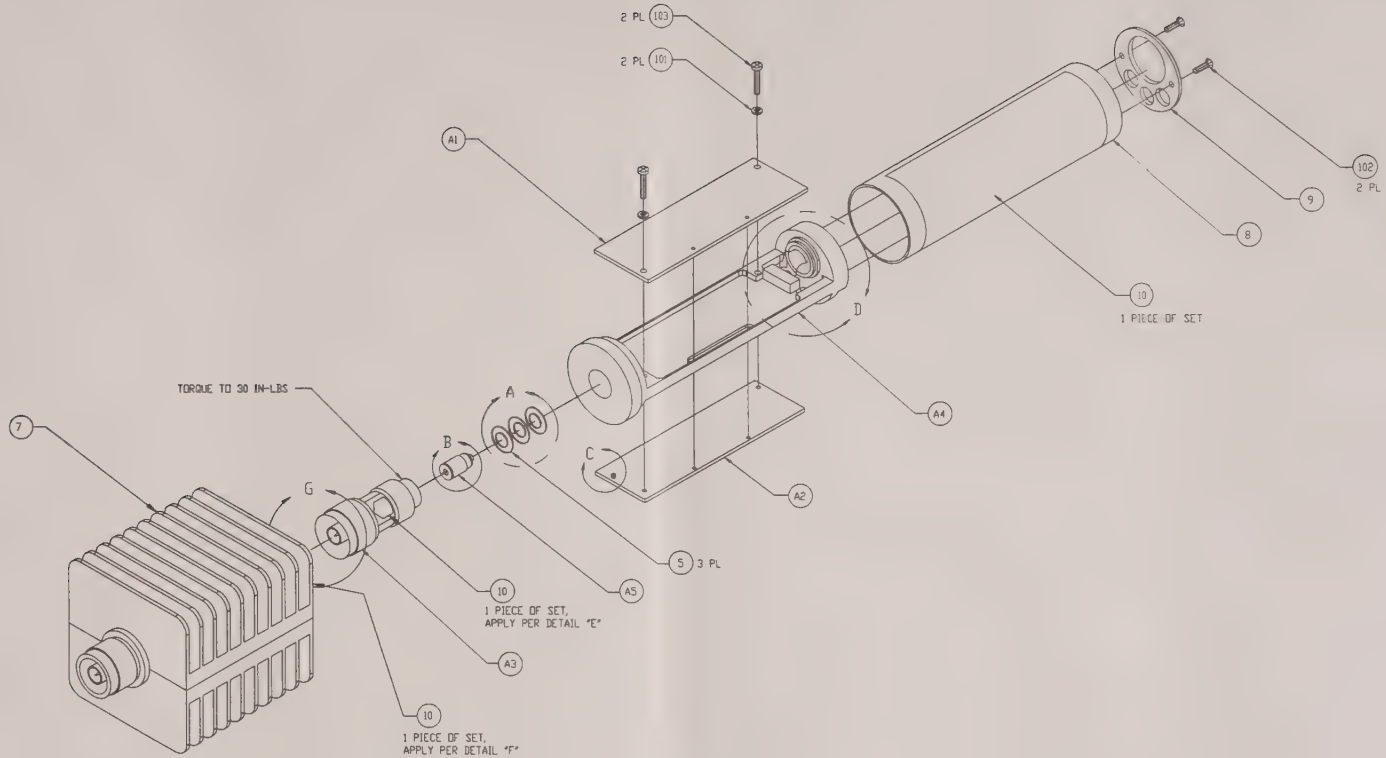
MODEL 80352A, SENSOR,
TYPE-N, 18GHz, 25W



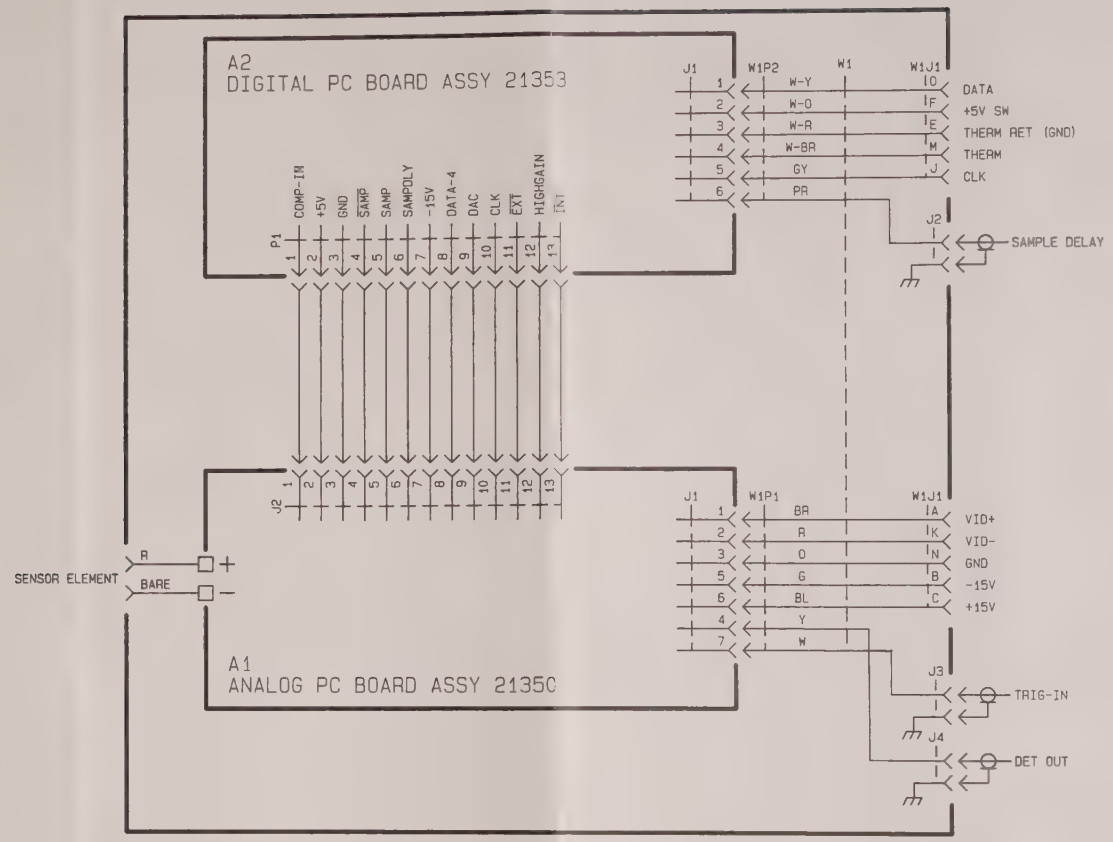
MODEL 80353A, SENSOR,
K–TYPE, 26.5GHz



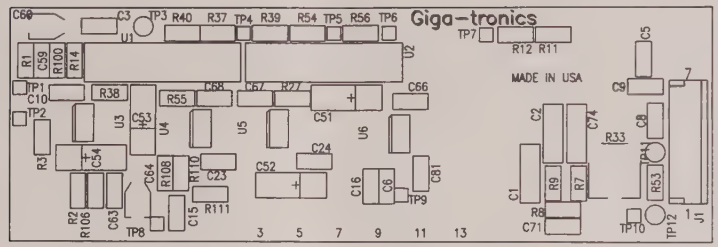
MODEL 80354A, SENSOR,
K-TYPE, 40GHz



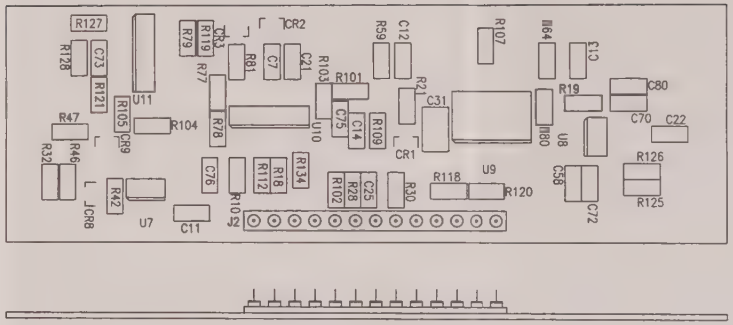
MODEL 80355A, SENSOR,
TYPE-N, 18GHz, 50W



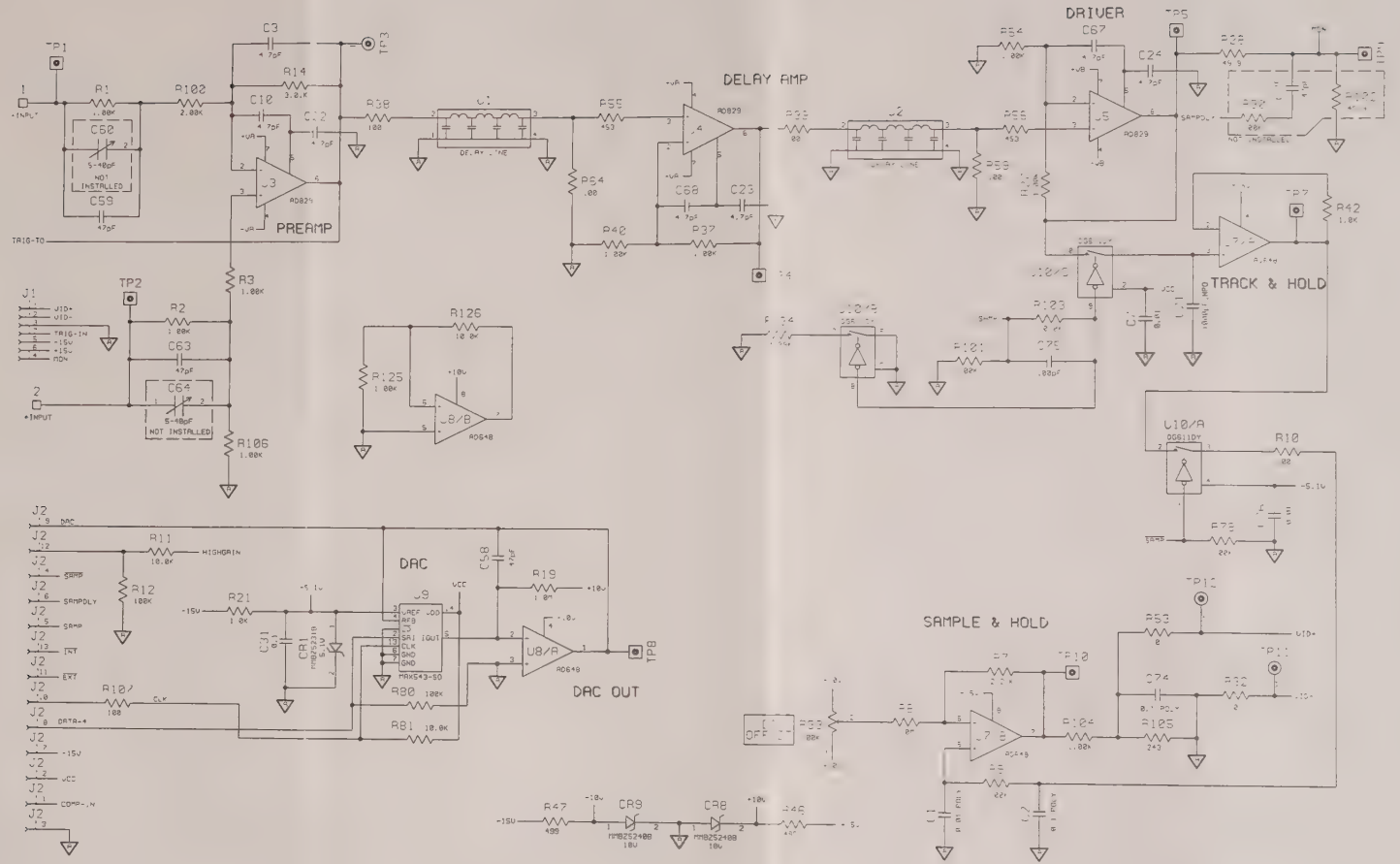
Schematic, 80350A Series
Triggerable Sensor
DWG# 21057 Rev A
Sheet 1 of 1
7-10



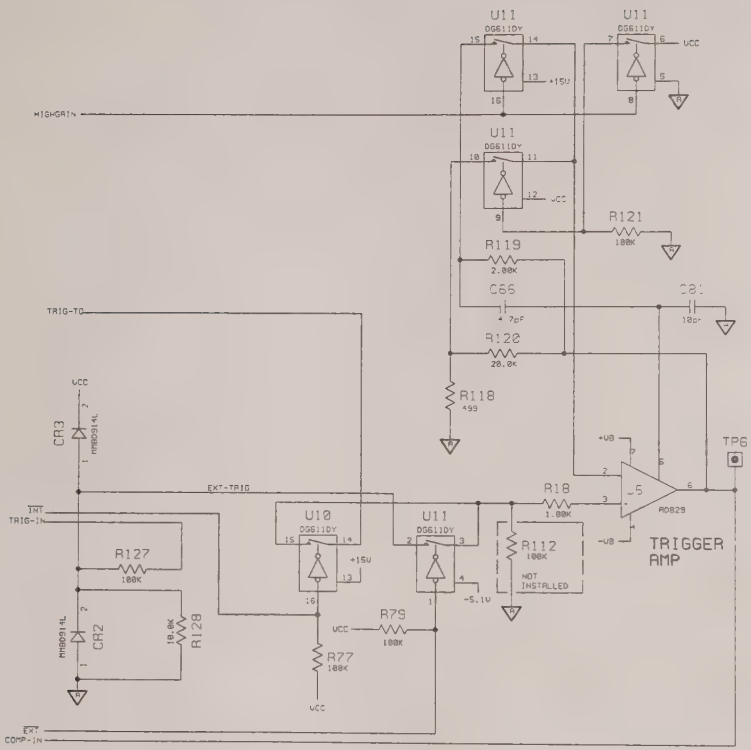
TOP SIDE

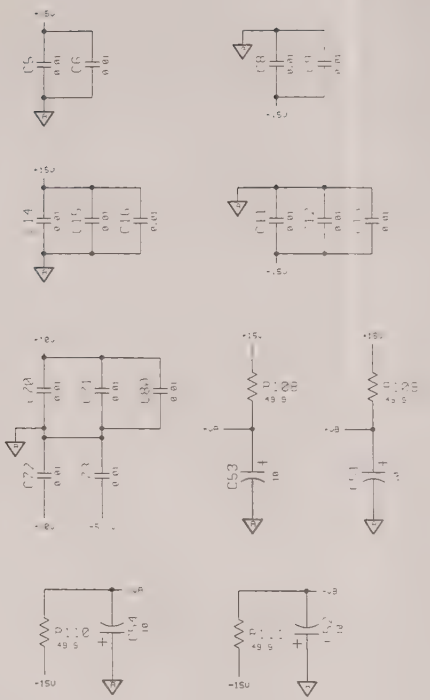


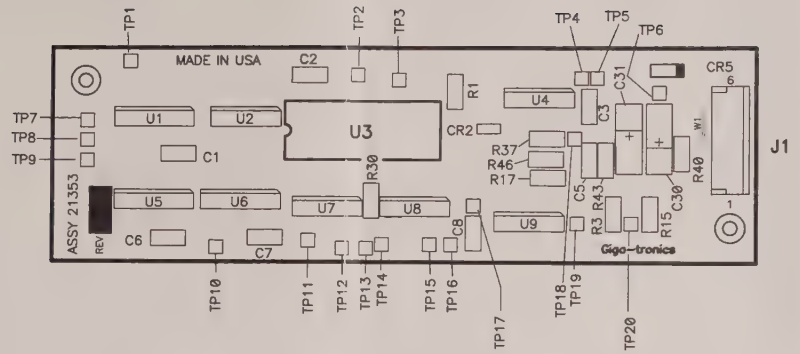
BOTTOM SIDE



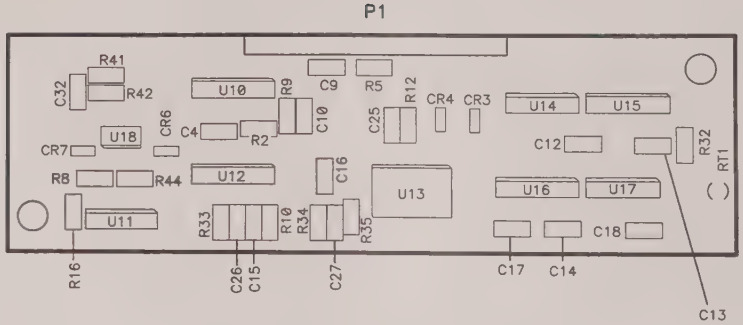
Analog Circuit Schematic (A1)
DWG# 21351 Rev G
Sheet 1 of 2
7-12


U11
DG611DY
U11
DG611DY
HIGHGAIN
U11
DG611DY
VCC
+15V
R121
100K
R119
2.00K
C66
4.7pF
C81
10pF
R120
20.0K
R118
499
TRIG-TO
VCC
CR3
MMBD914L
TP6
EXT-TRIG
TNT
TRIG-IN
+VB
-VB
R18
1.00K
AD829
TRIGGER
AMP
U10
DG611DY
U11
DG611DY
R112
100K
NOT
INSTALLED
-5.1V
R127
100K
MMBD914L
CR2
10.0K
R128
R79
100K
R77
100K
VCC
EXT.
COMP-IN


+15V
C5
0.01
C6
0.01
-15V
C8
0.01
C9
0.01
+15V
C4
0.01
C10
0.01
C11
0.01
-15V
C7
0.01
C12
0.01
C13
0.01
+15V
C20
0.01
C21
0.01
C18
10
-VB
C22
0.01
C23
0.01
C53
10
+15V
R100
49.9
-VB
+15V
R101
49.9
-VB
+15V
R110
49.9
C54
10
-15V
-VB
R111
49.9
C55
10
-15V



TOP COMPONENT SIDE



BOTTOM COMPONENT SIDE

Digital PC Assy (A2)
DWG# 21353 Rev R
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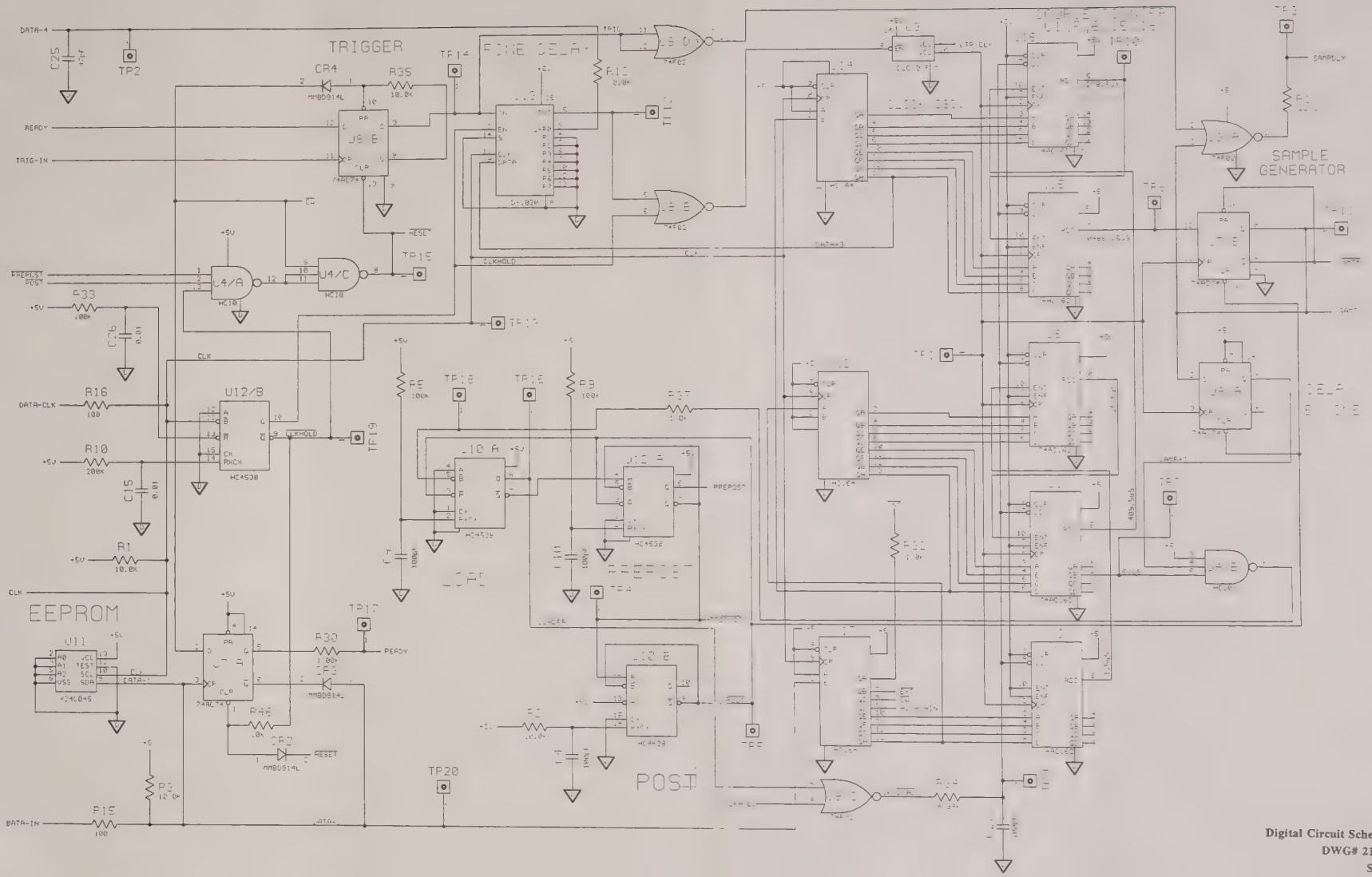

Digital Circuit Schematic (A2)
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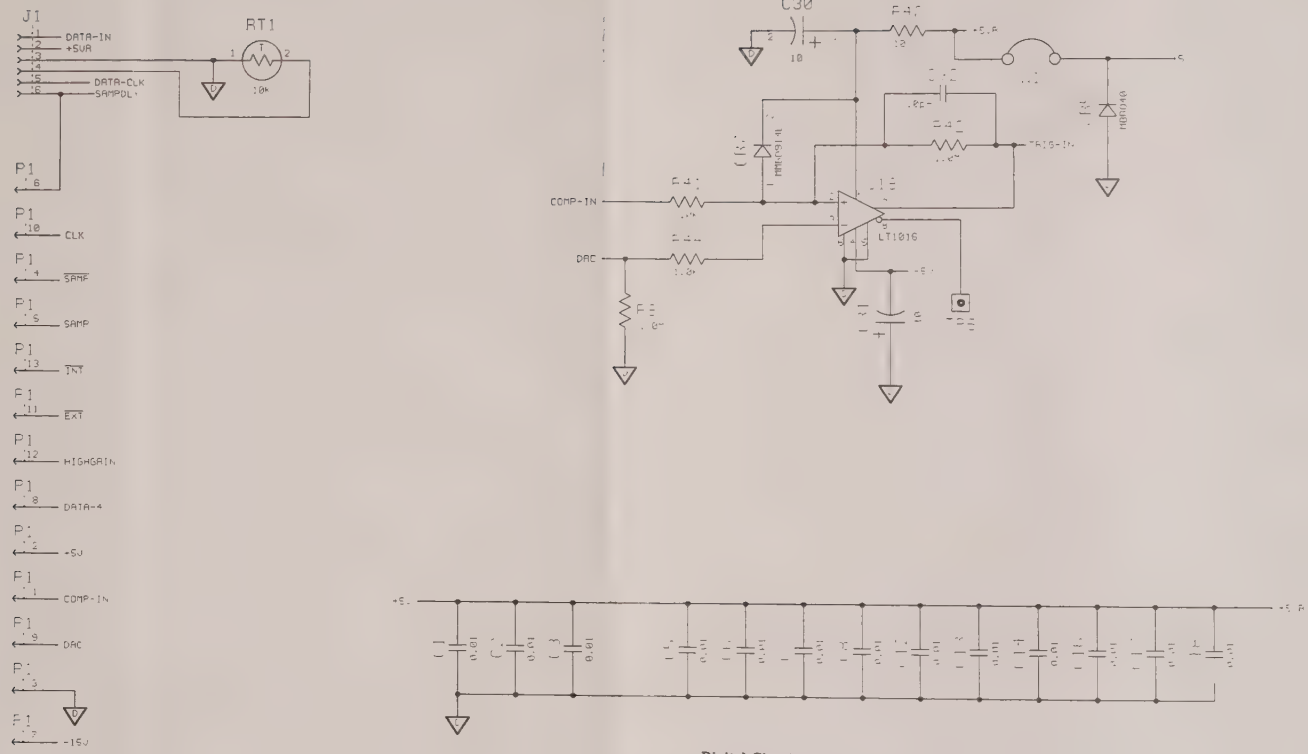
7-15



Digital Circuit Schematic (A2)
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